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THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

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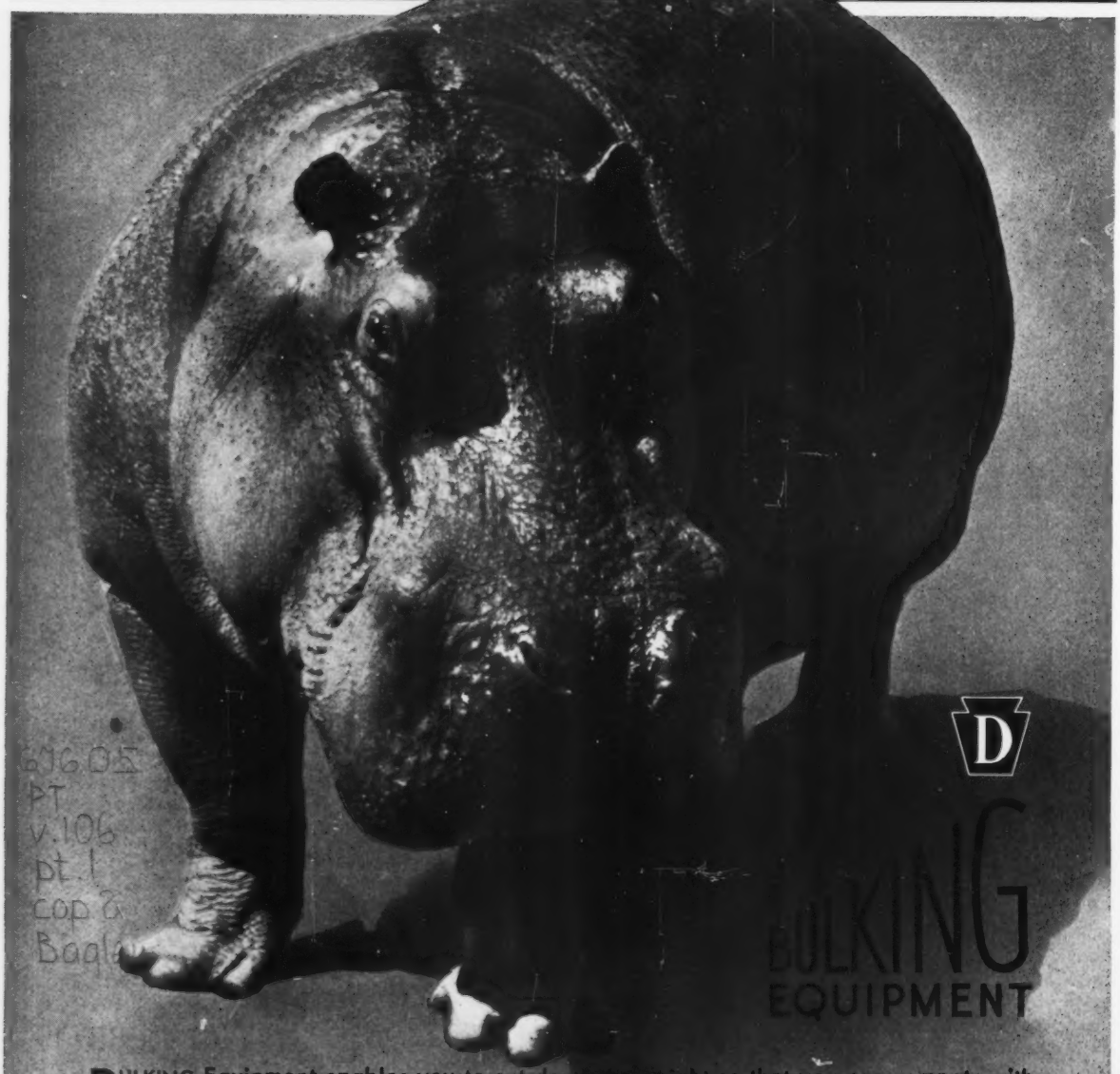

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PAPER TRADE JOURNAL

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

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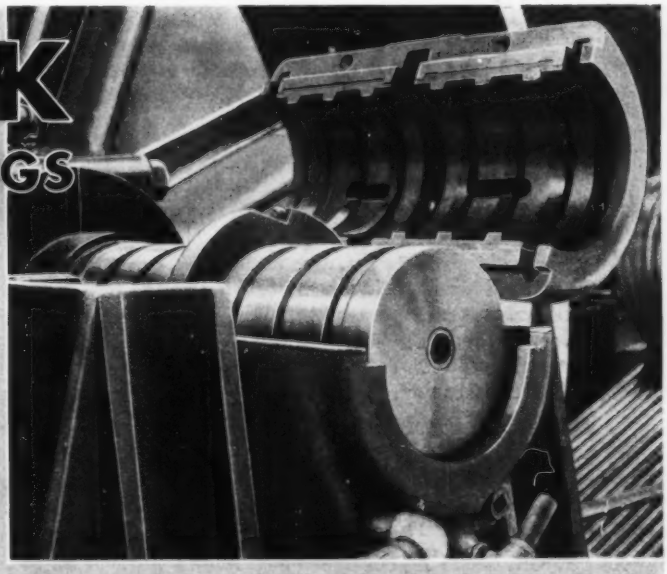
PLASTIC BEARINGS



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PAPER PAPER

Established Feb. 17, 1899
Consolidated Nov. 16, 1899
with Paper Trade Journal.

Vol. CVI, No. 1 Thursday, January 6, 1938

Established Sept. 21, 1918
Consolidated Feb. 19, 1925
with Paper Trade Journal.

Consolidated Plans for Larger Production

Head of Consolidated Power & Paper States 1937 Was Best Year Since Depression—Ahdawagam Reports Higher Production for Last Year — Whiting-Plover Announce Personnel Changes — Other Late Mill News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., January 3, 1938—Capacity operations in its mills at Wisconsin Rapids and Biron, Wis., are anticipated during 1938 by the Consolidated Water Power and Paper Company, according to a statement issued by George W. Mead, president.

"We are pleased to say that 1937 has been the best year since the blight of the depression," Mr. Mead says. "Our company's earnings have been good, and the outlook offers to us the greatest hope for increasing success."

This favorable situation has been brought about largely by the company's new grade of coated paper, whose high degree of attainment is evidenced by its widespread acceptance by publishers. Mr. Mead says further:

"Unable to answer this growing demand without additional manufacturing facilities, we launched an expansion program which is now nearing completion. A modern paper machine, equipped with the company's coating device and designed to produce 70 to 80 tons a day, is erected in a spacious new structure, the new building being large enough to provide space for added supercalenders and other converting machinery. This new paper machine requires more men, more power, more raw materials. Steam supply is being increased by the installation of extended stokers and new water walls on two of the four boilers. The water filtration plant is enlarged and facilities for the manufacture of bleached sulphite are augmented fifty per cent.

"To effect a still greater output of the company's new paper, a coating machine has been installed on the largest machine at Biron, requiring three new supercalenders and a large extension to the finishing room building.

"Adjacent to the new finishing room at the Wisconsin Rapids division, the company has erected a four-story mill office building to provide ample quarters for mill executives, drafting and engineering rooms, conference rooms and laboratories.

"These important construction projects have been designed and performed solely by the company's own engineers and workmen. Never before in our history has work been accomplished so promptly and efficiently. All classes of labor on these jobs have given to us a character of workmanship which employer and employee can regard with mutual pride. In all this expansion activity, the company has employed union men and transacted business with union committees, carrying out its established policy of collective bargaining and free expression.

"The present economic recession is an expression of fear. People are afraid of the last depression. Business is apprehensive of unsound governmental reform. There is, nevertheless, a need for the commodities which business enterprise is ready to produce. We greet the new year with the firm belief that prosperity is only temporarily impeded. Present indications are that Consolidated Water Power and Paper Company will run its mills in Wisconsin Rapids and Biron at full capacity, and we look forward to steady improvement in business."

Consolidated Has Large Holiday Payroll

The two-week payroll of the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., just before Christmas was the largest in the history of the company. Employees sharing in the payroll included both those in regular production and those on construction projects, and the total number was 1,105.

Ahdawagam Production Higher for Year

Production at the Ahdawagam Paper Products Company, Wisconsin Rapids, Wis., was about fifteen per cent ahead of the year 1936, according to Frank R. Walsh, manager. The company manufactures paper specialties. Although there has been a decline in demand of a quite general nature among the company's customers, it has been attributed partly to buyers taking more than their normal requirements during the first six months of 1937.

"We have talked to many buyers about their requirements for the coming year," says Mr. Walsh, "and some of them predict this will average lower in 1938 than in 1937, running low in the first quarter and a recovery by the middle of the year. The time and extent of this upturn will depend upon when and to what extent confidence is restored. The suspicions of many of these people regarding the motives and

(Continued on page 31)

Canadian Paper Industry Ends Record Year

Newsprint Production In November Only 3.2 Per Cent Below October — Recession In U. S. A. Makes Future Uncertain — Paper Co's. Stocks Weaker — Outlook for Pulp Industry — Meeting of Pulp & Paper Ass'n.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., January 3, 1938—The best year that the pulp and paper industry has experienced since the depression—a year which has seen new financial foundations completed for many bankrupt companies and production consistently maintained on record levels—has closed not with a spirit of robust optimism pervading the industry, but with the unsettling feeling caused by a large question mark as to the outlook for the present year. Just as the marketing structure in the newsprint industry appeared to have been rebuilt on sound lines, there came the recession in the United States market, with the result that newsprint statistics for the two closing months of 1937 were anything but reassuring, despite the fact that from the end of October most of the important mills were operating on a five-day basis, the production in November was only 3.2 per cent lower than for October. This reflected the bringing into production during the month of new machines by certain of the newsprint companies. That is not all, for early in the present year the giant new mill which the Ontario Paper Company has been building at Comeau Bay, Quebec, will come into operation, with a daily capacity of 320 tons of newsprint. True, this is all scheduled for the New York Daily News, but it will represent that much more in total production.

Demand the Index for 1938

Everything, of course, will depend upon how consumption keeps up in the present year. There is no fear here of chaos being precipitated by cutthroat competition and price-cutting. Not only have the newsprint operators fresh in their minds a salutary example of the destructive effects of such a policy, but the Premiers of both Quebec and Ontario have committed themselves to a policy of taking punitive action against companies which do anything to upset the marketing situation. Actually, with a majority of the companies now in good shape, both physically and financially, the newsprint industry is in a healthier condition than for many years.

Outlook in the Pulp Business

Conditions in the pulp industry are somewhat different from those prevailing in the newsprint field. During the year pulp prices have advanced sharply on widely expanding demand, especially in the bleached sulphite field. With the business recession in the United States and the closing of the Japanese market, demand has, however, been falling off. The situation remains better than in the newsprint field, but the early outlook depends on the duration and extent of the business recession.

Annual Meeting of Pulp and Paper Association

The 25th annual meeting of the Canadian Pulp and Paper Association will be held in the Pulp and Paper Research Institute, Montreal, on Friday, January 28th. As is usual, the annual meetings of the Technical and Woodland Sections will be held during the same week. Meetings of these sections will be held on January 26, 27 and 28, the Technical Section meeting in the Mount Royal Hotel and the Woodlands Section in the Windsor Hotel, and in each Section technical papers on a wide variety of subjects appertaining to the industry will be read. The Association's annual luncheon will be held in the Mount Royal Hotel on January 27, and on the evening of January 28 the Association will hold a "cabaret dinner" in the Mount Royal Hotel. Detailed programs in connection with the various fixtures will be announced later. Large attendances are expected, especially in view of the importance of the business to be discussed, and it is expected that there will be some distinguished guests.

A Fleet of Newsprint Ships

The former ships of the Canadian Government Merchant Marine, which were taken over two years ago by the Montreal Australia New Zealand Line, are to be used this winter solely for transporting newsprint from Canada to the Antipodes.

Five of the former C.G.M.M. fleet are still in active service—Constructor, Challenger, Conqueror, Cruiser and Highlander. They started on the paper run this summer, out of Montreal, Rimouski and Port Alfred, and are continuing this service during the present season from the Maritimes.

A Fleet of Newsprint Tugs

Orders have been placed here for the building of five Diesel-engined tugs for use in the transportation of newsprint by barges for the Abitibi Power and Paper Company. Canadian Vickers, Montreal, will build two of the powerful little vessels, and the remaining three will be constructed by Marine Industries Limited at the Manseau Shipyards, Sorel.

The designs are by Lambert and German, naval architects of Montreal. The tugs will be used by the paper company for towing newsprint barges on the Great Lakes.

The contracts awarded Canadian Vickers are for two 140-foot vessels, of 950 horsepower each. They are to be used on Lake Superior. One of the tugs will be powered by Atlas Polar twin Diesel engine, the other with similar engines of Sulzer design.

Powered with 660 Diesel Motors

At the Manseau shipyards, Sorel, two tugs of 96.6 feet each are on order. These vessels will be powered by twin Diesel engines of 660 horsepower, both built by Sulzer. The tugs are to enter the Abitibi company's service on Lake Nipigon.

The remaining vessel to be built by Marine Industries is a 96.6-foot craft, with a single Diesel engine of 336 horsepower. She will operate out of Sault Ste. Marie. A Sulzer engine will also be installed in this one.

Chicago Trade Expects Improved Demand

Improvement In Some Grades of Paper Creates More Optimism for Future Trade — Salesmen's Ass'n of Paper Industry Gives Xmas Party — Fairbanks, Morse & Co. To Occupy New Offices—Other Late News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., January 3, 1937—Holiday inactivity permeated the Chicago market during the week. Commitments were few as buyers obviously waited for careful inventory check-ups before entering the various markets. Local mill representatives and jobbing firms were almost unanimous in their opinion that stocks on hand were very low and that this situation should lead to an appreciable improvement shortly after the turn of the year. Such advance predictions have, in fact, actually brought some improvement in certain grades during the week and the specific markets continue to retain a marked stability.

Ground Wood Papers More Active

Groundwoods continued to show slightly more strength than most of the other lines, with newsprints also carrying comparative strength over into the past week. Kraft papers, in general, were featureless, denoting the spasmodic buying which characterized the Christmas business. Specialty papers were little changed. Fine papers provided no particular news, the bonds of all grades continuing with fair underlying firmness though demand was reported inconsequential. Books and covers showed no disposition to change to any extent, as the market watched the general business picture with considerable anxiety. Waste papers were very weak with mills buying little or nothing. Reports indicate that the waste market locally is in about as prostrate a condition as it has been for many months.

Salesmen's Assn. Hold Xmas Party

The midwest division of the Salesmen's Association of the Paper Industry held its annual Christmas party on December 29 in a private dining room of the Hotel Sherman. One hundred salesmen and guests combined to make the day one of the most festive of its kind yet held. Ben K. Babbitt of the Brown Company was the genial chairman of the event which featured the customary group singing led again by the indomitable James H. Coy, Sr. The Association was also privileged to listen to a repeat performance given by Harold Pfister of Bradner Smith & Company and Harry N. Kerr of the Travelers Insurance Company with a generous quantity of piano duets. Mr. Pfister is one of the star sales producers of Bradners and was introduced as good a salesman as he is a piano player. The usual impromptu speeches, varied entertainment and jollification aided in making the party most enjoyable to all in attendance.

Fairbanks, Morse to Occupy New Offices

Fairbanks, Morse & Company, important suppliers to the paper trade, will soon open its new offices at 600 S. Michigan avenue. The former location at 900 S. Wabash avenue, is to be vacated in favor of a five floor location in the former International Harvester Building which has been remodeled and redecorated. The first floor will be occupied by a display room, the second by offices of the Chicago branch, the third by purchasing and traffic departments and the fourth and fifth by sales division and executive offices. Approximately 55,000 square feet of floor space will be used.

Book Paper Assn. to Meet Jan. 7

The Book Paper Manufacturers Association will hold its next Chicago meeting at the Hotel Blackstone on January 7. The general meeting of the Association on that date will be preceded by a meeting of the executive committee scheduled for the same hotel on January 6.

Filer Fibre Co. Issues House Organ

Another interesting house organ has made its appearance in the local market with the initial issuance of "Filer Fibre Folks", published by the Filer Fibre Company with factory in Michigan and the main sales office at 520 North Michigan avenue, Chicago. The house organ is an informal affair with the announced purpose of binding Filer executives and Filer users into a more well acquainted unit. The first issue contains an historical sketch written by P. P. Schnorbach, president. The company was organized in 1916. F. X. Meiners is the sales manager of the company with offices in the Chicago headquarters.

"Dick" Bull to Return to Business Soon

The many friends of Richard S. "Dick" Bull, president of Bradner Smith & Company, will be pleased to learn that he is expected to return to his desk shortly after the first of the year. Mr. Bull became seriously ill in August, was operated on four months ago and has been taking it easy in California for almost the entire past two months. He is reported to have returned to Chicago for the holidays and to be in shape to resume his duties after January 1.

Decline in Workers and Wages

Figures covering the paper and printing industry in the seventh Federal Reserve District showed a sharp decline for the week ending November 15 according to figures released this week covering Wisconsin, Michigan, Indiana, Illinois and Iowa. The 705 paper and printing firms reporting showed 79,058 wage earners making a total of $2,230,000 in earnings for the period. The number of wage earners showed a 2.3 per cent decline as compared to the week of October 15, while the earnings indicate a 3.8 per cent decline as compared to the October date. However, the paper and printing industry gave a better account of itself than did the total manufacturing group as a whole wherein the decline in wage earners was 3.6 per cent and in earnings 9.7 per cent.

Speculative Buying of Pulps Misleading

Spot Market Price of Chemical Pulps Not Reflected In Price Received By Producers — Variations In Contract and Spot Prices Held Misleading To Public—Bleached Sulphite Pulp Now At $60 Ton—Other News.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., January 3—The recent relative sharp drop in the spot market price of sulphite pulp has caused some uneasiness among investors holding pulp company securities. The situation, which at one time threatened to cause difficulties for the pulp manufacturers, has been overcome largely and indications are that for 1938 operations will be on a fairly stabilized basis with production and selling value somewhat lower than experienced in 1937.

The troubles of the pulp industry were the same as those being experienced in other lines—adjustment of inventories made necessary by the business recession in the United States. Fortunately steps were taken to bring about this adjustment three or four months ago so that the industry enters the New Year with inventories of reasonable proportions.

Speculative Buying of Pulps Misleading

Considerable publicity has been given to the sharp advance in the demand for and value of chemical pulps in the past two years. The widening market of the product stimulated the demand. Further there developed a considerable speculative interest which put the spot market price at an exceptionally high level and one which was definitely misleading, in that it did not reflect the price received by the manufacturer.

As an aftermath of the N. R. A. the marketing of chemical pulps is conducted on a basis somewhat misleading to the uninitiate. The contract price is set for each three months period of the year, the price for the quarter being announced thirty days before. A buyer at the beginning of the year may contract at the prevailing contract price for delivery a year later. If the market advances in the interval, his pulp may be delivered at a time when the prevailing market price is $5 or even $10 a ton higher.

Then there is the spot market price. There is often a wide variation in this and the contract price. Until lately the spot price has been appreciably higher and on that account widely publicized as the "price" of pulp, when actually the greater part of the pulp bought is at the lower contract price. Consequently, it has been pointed out, there has been a general misconception, outside of the trade, as to the true values which have been prevailing.

Owing to the rapid increase in the demand for pulp, users have followed the practice of contracting for more than they require. In the past this has been very profitable as the profit made on the surplus sold brought down the cost on the pulp actually used. This practice is especially common in the American market, which secures a large proportion of its import requirements from the Scandinavian producers.

The making of long-term contracts at varying prices—one producer may have several contracts with the one importer at more than one price level for delivery in the same year—has worked very well in a rising market. But the reverse has been true in a falling market and last September conditions became highly involved. With the falling off in consumption and the drop in the price of pulp the importer or user of pulp has no desire to fill these contracts. Distress selling by those overbought affected the spot market and also hit the contracts market, in which the Canadian operators had an interest. Adjustment of prices was made to hold the market.

First Quarter Price of Bleached Sulphite $60 Ton

For the first quarter of 1938 bleached sulphite is priced at $60 a ton, as against $70 a ton in the fourth quarter of 1937. It is important to realize that few of the producers received the $70 in the past quarter, while there probably was not a sale at the announced spot price of $90 a ton. So far as the manufacturer is concerned this "drop" has less significance than indicated by the market report. Other grades of pulp also are affected. Unbleached sulphite is priced at $50 against $57 and soda pulp at $58 against $65 in the fourth quarter of last year. It is pointed out that the new prices restore the approximate levels which prevailed in the third quarter of 1937.

Nipigon Town Expanding

Famed all over the world as a jumping off place for the finest speckled trout fishing grounds in the continent, the town of Nipigon is branching out in a new role as the centre of a promising industry—the manufacture of sulphite pulp. Situated on a particularly beautiful site on the sweeps of the Nipigon River the settlement makes an ideal vacation centre and summer playground. Five miles to the southwest the major development at Red Rock—construction of the 200-ton mill and town-site for the Lake Sulphite Pulp Company—has brought a heavy influx of visitors from many parts of the country. As a result business has boomed and several important buildings, including a new town hall and post office, as well as numerous homes and business structures, have been added to the town site. A prosperous season in pulpwood camps surrounding the town also has had its part in increasing the business turnover, and bush workers are to be seen by the hundreds.

K. A. Forrest Leaves Crossett

The Crossett Paper Mills, Crossett, Ark., has issued the following announcement:—

"K. A. Forrest, having completed his work with the Crossett Paper Mills in connection with the construction and organization of their new 200 ton plant, will no longer be active with this company after January 1.

"Officials of the company as well as engineers and contractors who designed and built this modern plant acknowledge their indebtedness to Mr. Forrest's wide experience in mill construction, including the application of several new ideas not heretofore used in paper mill designing."

P. T. A. Give Fifth Lecture on Paper Making

Paper Salesmen Study Course Sponsored By Philadelphia Paper Trade Ass'n — Give Lecture On "The Romance of Wrappings" — John Conradi Serves Paper Trade Half Century—P.T.A. To Hold Meeting Jan. 7

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., January 3, 1938.—The fifth in a series of lectures in the Paper Salesmen's Study Course, being conducted under the auspices of The Paper Trade Association of Philadelphia, will be given in the Franklin Institute tomorrow evening. This lecture, dedicated to "The Romance of Wrappings," will be under the direction of W. B. Killhour, president of Quaker City Paper Company, and Chet. A. Spaulding, assistant-secretary of the National Paper Trade Assn., of the U. S., Inc., together with

JOHN CONRADI

J. R. Halkyard, vice-president of Providence Paper Company, Providence, R. I., who will be guest speaker.

Lecture Number six in this series will be held January 11th, and will consist of "Moving Pictures of Paper Making," taken at the Savannah plant of The Union Bag & Paper Corporation. It will be conducted by W. O. Rogers, Jr., and T. A. Lawley of the New York and Philadelphia Divisions, respectively, of Union Bag & Paper Corporation. Harold S. Peckham of Hammermill Paper Company, will also participate.

John Conradi Serves Paper Trade 50 Years

At the close of the year, John Conradi of the D. L. Ward Company, Terminal Commerce Bldg., 401 North Broad street, rounded out fifty years' service in the paper industry. In an interview with Mr. Conradi, he said: "I commenced my business life with Irwin N. Megargee & Company, then at 617 Chestnut Street. This was in 1887 and I was a boy of twelve years of age. This firm later moved to 18 North 6th street. My father worked for this same firm until the time of his death. With the exception of the time I served in the Spanish-American war as Corporal in Company E, 2nd Pennsylvania Volunteer Infantry, I have been in the paper business. During my early connection with the paper trade, I very vividly recall the blizzard of March 12, 1888. And also when the Bi-centennial parade was held, which by the way, was a large industrial parade, we were very proud of our team of four horses that participated in this never-to-be-forgotten event.

"I have been associated with my present employers, D. L. Ward Company, since 1919. I have enjoyed every minute of my connection with the paper industry and have seen it grow from a very primitive one until today it ranks third in our country.

"I might add that during the World War, to be in the selling end of this business, which I was, with paper scarce and prices rising every week, and endeavoring to get paper to supply the demand, was very exciting."

P.T.A. to Hold Annual Meeting Jan. 7

The annual meeting of the Paper Trade Association of Philadelphia will be held on January 7th with luncheon at 12:30 in the Down Town Club, at which time election of officers for the ensuing year will take place.

S. Maxman to Visit South

Samuel Maxman, waste merchant of 515 South Randolph Street, accompanied by Mrs. Maxman, will leave Saturday next for Miami Beach, Florida, returning in April.

Acquires Fibredown Division

The General Cellulose Company, Inc. of Garwood, N. J., has acquired from the Rochester Folding Box Company, of Rochester, N. Y. what was previously known as the Fibredown Division. This purchase covers the trade name, "Fibredown", the embossing and converting equipment originally used in conjunction with this business and the good will.

This acquisition is in addition to a purchase from the Veldown Division of the International Paper Company of part of the cellulose converting equipment used at their plant in Glens Falls, N. Y.

With this additional equipment, the General Cellulose Company, Inc. will have at its disposal what is said to be the most complete and versatile embossing and converting plant for cellulose wadding in the country. With the addition of this new machinery, they will be in a position to supply candy wadding, combine cellulose with any type of paper backing and do various kinds of embossing, die cutting and converting of every description.

Further announcements will be made through advertisements and direct mail to the paper houses throughout the country at a little later date.

Financial News of Pulp and Paper Industry

Penn Fibreboard Corp. Plant At York, Pa., Bought By Southern Kraft Corp.—Rising Paper Co. Votes First Dividend In Several Years—Survey Launched To Check Current Business Trend In Sales and Inventories.

New York Stock Exchange

High, Low and Last for the Week Ending January 5, 1938

	High	Low	Last
A. P. W.	5	3⅞	5
Armstrong Cork Co.	34¼	32	33⅝
Celotex Corp.	23¼	20¼	23¼
Celotex Corp., pf.	56	56	56
Certain-Teed Products Corp.	8	6½	7⅝
Certain-Teed Products Corp., pf.	28¼	24¾	27⅞
Champion Paper & Fibre Co.	28	27¼	28
Champion Paper & Fibre Co., pf.	103⅞	103⅞	103⅞
Congoleum-Nairn Co.	23⅝	20¼	23¼
Container Corp. of Amer.	13½	12¼	13
Continental-Diamond Fibre Co.	7⅝	7¼	7⅜
Crown-Zellerbach Co.	11	9	10½
Crown-Zellerbach Co., pf.	66	61½	66
Flintkote Co.	17	14¾	16⅛
Robert Gair	4	3½	4
Robert Gair, pf.	15½	13	15½
International Paper & Power	8⅞	6⅝	8¼
International Paper & Power, pf.	36	30¼	33½
Johns-Manville Corp.	81½	76	78
Johns-Manville Corp., pf.	124	123	124
Kimberly-Clark Corp.	20½	20	20½
MacAndrews & Forbes	30½	30½	30½
Masonite Corp.	35	31⅞	34
Mead Corp.	12½	10¼	12⅛
Mead Corp., pf.	50	50	50
Paraffine Companies, Inc.	36	34½	36
Ruberoid Co.	20	20	20
Scott Paper Co.	38	37½	38
Sutherland Paper Co.	19	18½	19
Union Bag & Paper Corp.	10⅜	9⅛	10
United Paperboard Co.	4½	4	4½
U. S. Gypsum Co.	72	68⅛	69⅞
U. S. Gypsum Co., pf.	166	166	166

New York Curb Exchange

High, Low and Last for the Week Ending January 5, 1938

	High	Low	Last
American Box Board Co.	7⅜	7	7⅛
Brown Co., pf.	26½	21¼	26½
St. Regis Paper Co.	3⅜	2⅞	3⅜
Taggart Corp.	4⅝	3⅜	4½

Penn Fibreboard Corp. Sold

YORK, Pa., December 24, 1937.—The plant, lands, water rights and all of the board corporation in Spring Garden township along the old Plank road and the Maryland and Pennsylvania railroad has been sold to the Southern Kraft Corporation, a subsidiary of the International Paper Corporation, 220 East 42nd street, New York. The buyer operates a mill manufacturing wrapping paper at York Haven and has several other large paper plants in various parts of the country.

The deal was made by the execution of a mortgage for $600,000 to cover 24 non-negotiable promissory notes for $25,000 each without interest respectively payable on April 1, 1938, and quarter-annually thereafter until all have matured. The deed calls for the transfer by Penn Fibreboard to Southern Kraft of seven tracts in Spring Garden township. The transfer includes all buildings, paper machines, tools, beaters and all other equipment as well as the right to maintain and use water from a dam in the Little Codorus creek on the former John Landes property, which formerly provided power for what was known as Dosch's mill, and all other rights held by the grantor as conveyed by predecessors in title to it.

The deal was made in pursuance of authority of resolution duly adopted at meetings of the board of directors and stockholders of the Penn Fibreboard Corporation, according to the papers now on record. The deed is dated December 13 and is signed by Isador Etra, president, and William Etra, secretary of the Penn Fibreboard Corporation.

The Southern Kraft Corporation is a concern chartered in Delaware. Penn Fibreboard is a Pennsylvania corporation, the charter of which fixes its principal place of business in York county. For some, time it has maintained its office at 551 Fifth avenue, New York city. There were numerous stockholders in York, but the majority stock was held by residents of New York.

The local plant is said to employ 125 men.

Taking Business Trend Survey

How's Business? That is the question which Dun & Bradstreet is asking 2,000,000 business concerns in the United States in a questionnaire which deals with four fundamentals, 1. Sales, 2. Inventories, 3. Receivables, 4. Improvements. The Business Trend Survey has been undertaken to provide an accurate test of the pulse of American business based on operating experiences of the past three years. Preliminary findings of the survey will be published early in March after the Credit Agency's Research and Statistical Division completes the analysis of returns.

While the questionnaire to be answered is simple the results are expected to offer a comprehensive picture of all lines of trade and industry by classification, size and region.

In addition to the trends of sales, inventories, and receivables since the last general census conducted by the Government, Dun & Bradstreet expect to obtain some pertinent information as to the extent to which business men have undertaken improvements and expansion during the past year.

The Business Trend Survey replaces the Retail Survey which has been conducted by the agency during the past five years. The changes in the Retail Survey were so slight and so commonly in the expected direction, that this year it was believed that a survey of business trends would be of greater service to business.

Rising Paper Co. Votes Dividend

Directors of the Rising Paper Company voted a dividend of $1.50 per share on the preferred stock last week, Pres. Walter J. Raybold announced. It is the first dividend to be paid in several years, he said, adding, the company's business outlook for 1938 is good.

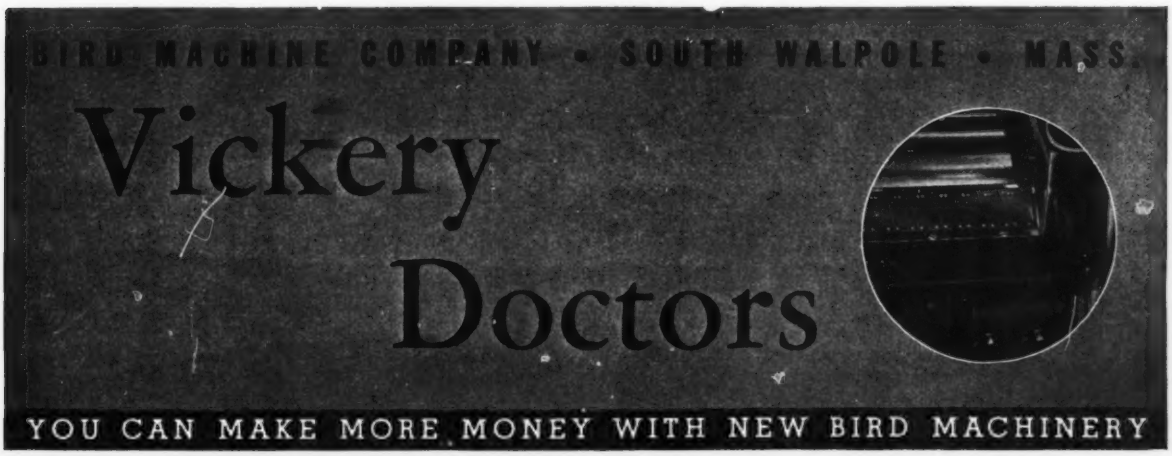
D. F. Monroe Co. Give Luncheon

BOSTON, Mass., January 3, 1938.—On the occasion of the inventory-taking of the D. F. Munroe Company at their warehouse, Thursday, a luncheon, served by the H. J. Seiler Company was given to the sales force, by the paper house.

NO RECESSION

OF ORDERS FOR VICKERY DOCTORS

The demand for *cleanest rolls at lowest cost* continues. Vickery Doctors are being installed on wire rolls, breast rolls, press rolls, smoothing rolls, breaker rolls, dryers, calenders and super-calenders. It isn't a question of whether you can afford the small investment in Vickery Doctors, but of whether you can afford to operate dirty rolls. On that basis, let the Vickery Doctor prove its case for any or every roll in your machine room. Are you willing to be shown?



General Electrical Developments

The following items are taken from an article entitled "Developments in the Electrical Industry During 1937," by Guy Bartlett in the January issue of General Electrical Review for January, 1938:

Winder Drives

Regenerative, adjustable-voltage tension-control winder drive, which has proven so successful, underwent further development in 1937. The braking generator now may be used as a motor during the threading operation and as a generator throughout the entire speed range of the winder during the winding operation. Provision has been made for automatically easing off the sheet tension during acceleration and for automatically increasing the tension during retardation. Dynamic braking is used on both the winder drums and the unwinding roll. Means were also provided during the year for separately driving the rider roll.

Tension Balance

A system was developed for sectional, electric, paper-machine drives whereby sheet tension is balanced by generated power and the drier motor is forced to carry the friction load of the driers at all times. On paper machines making heavy papers and on some machines making special papers, it is possible to unload the driers partially or completely and actually drive them with the sheet of paper. This has always resulted in difficulties during a snap-off because a loop forms in the sheet immediately ahead of the last drier section, before the drier motor can assume its load. When a snap-off occurs with the new system, the tension generator immediately drops its load.

Motor-driven Turbine-governor

Mechanical-drive steam turbines, used extensively for driving paper machines, need a considerable speed range to accommodate the various weights of paper that may be made on the machine. A fly-ball governor is a very accurate and satisfactory device up to about 3:1 speed range, but on greater speed ranges the loss of power at low speeds makes this device unsatisfactory. For speed ranges up to 24:1 there is now a motor-driven governor which operates entirely within the 3:1 range but, by means of electric gearing, the turbine speed can cover a span of as much as 24:1 with a high degree of accuracy of control throughout the whole range. The fly-ball governor is driven by a small synchronous motor which is energized by an alternator geared to the turbine. This makes a satisfactory non-slipping connection between the two units. The effect of a gear-shift system is obtained by changing the number of poles in the generator and in the synchronous motor.

William B. Milham Honored

[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., January 3, 1938.—On Wednesday, December 29, 1937, William B. Milham was the guest of honor at a dinner served at the Park Club to commemorate his eightieth birthday. The dinner was attended by nine directors of the Bryant Paper Company, of which Mr. Milham is chairman of the board. He served as president of the Bryant mill from 1932 to the present year and has been identified with the company since its organization.

Mr. Milham was presented with a parchment scroll on which is engrossed a congratulatory resolution of the board of directors, this resolution to be written int the records of the company. There was also delivered to the Milham home a bouquet of eighty roses, one for each year of his life. Present at the dinner were Allen B. Milham, secretary of the Bryant Paper Company and W. T. Schmitt, president, directors Dr. Rudolph L. Gilkey, Joseph E. Brown, Charles Clarage, Dr. S. Rudolph Light, William J. Lawrence, Frank E. McAllister and William E. Kidder.

Alexander Thomson Made Adv. Mgr.

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, January 3, 1938.—Appointment of Alexander Thomson, Jr., Cincinnati, Ohio, as advertising manager of the Champion Paper and Fibre Company, with its main offices in Hamilton, was made today. Mr. Thomson succeeds E. Kenneth Hunt, of Wyoming, who died suddenly two months ago at Hot Springs, Va.

The new manager has been with the company for ten years, working first at various jobs in the mill at Hamilton then was transferred to the research, advertising and sales departments.

While in the Cincinnati sales office Mr. Thomson was president of the Cincinnati Association of Industrial Marketing, director of the Advertisers club, director of the boy scouts and of the Ohio Humane society.

For the last two years, he has been assistant manager of the Cleveland office of Champion.

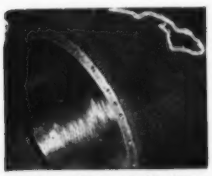
Corinth Mill Gets Pulpwood

[FROM OUR REGULAR CORRESPONDENT]

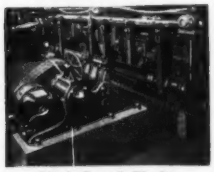
CORINTH, N. Y., January 3, 1938.—A contract for 20,000 cords of pulpwood for the local branch of the International Paper Company is being handled by the Johnson & Sons Lumber Company, at Bennington, Vt. Lumberjacks have been busy cutting the timber in the Green Mountains since last spring and it will take several weeks to transport the pulpwood to the mills here. About 100 lumberjacks now are employed in the forests making the timber ready for shipment and a force of 25 trucks has been given the task of transporting the logs to the mill. It is estimated that more than two months will be required to complete the transportation job.

Set-Up Box Division of Ohio Boxboard Co. Only is Acquired

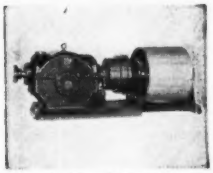
In the issue of the PAPER TRADE JOURNAL of December 30, 1937 it was erroneously stated that the Great Lakes Box Company, Cleveland, Ohio, had acquired the Ohio Boxboard Company, manufacturers of paper box boards, folding cartons, corrugated and fiber shipping containers, etc. The Great Lakes Box Company has acquired only the set-up box division of the Ohio Boxboard Company and the box boards, folding cartons, corrugated and fiber shipping containers were not affected by the transaction.



Rubber-Covered Suction Roll



High-Speed Shake



Hypoid Bevel Gear Drive

Silent Chain Dryer Drive

Balanced, Oilless Steam Joints

Hi Speed Dryer Condensate Remover

Automatic Winder and Roll Unloader

You Pay *for these* Improvements whether you use them or not

During the many recent hearings at Washington experts have testified that nearly one-third of all paper in this country is made on obsolete machines.

With wages and hours definitely set, the only way to make additional profits is through the operation of your machines. Use of less power to perform the same job, consumption of less oil and materials, elimination of undue break losses, lower clothing costs, production of better paper, speeding up of production—these are but a few of the many items that MODERN Beloit machinery can help to correct very definitely.

Thus, when you are not taking advantage of the Beloit improvements that are known and available to you for lowering your costs—your profits are just so much less—and whether you use these improvements or not, you actually are paying for them. The difference that you would save would soon pay for the new and improved equipment.

These facts have been established frequently in our contacts with mills and can be proved to you conclusively.

BELOIT IRON WORKS PAPER MACH'Y BELOIT, WIS.

THE BELOIT WAY IS THE MODERN WAY

BELOIT

Beloit Iron Works, Beloit, Wis., U.S.A. Founded 1858

TAPPI Tentative Annual Meeting Program

The Technical Association of the Pulp and Paper Industry will hold its annual meeting at the Waldorf-Astoria Hotel, New York, February 21-24, 1938. The following are some of the papers to be presented:

Economic and Technical Aspects of Wood Pulp as a World Commodity, by R. B. Wolf.

Reasonable Sanitary Standards for Paper Products, by J. R. Sanborn.

Container Standards, by J. D. Malcolmson.

The Corrugated Paper Crush Test, by Pierre Drewsen.

Requirements for the Packaging of Various Types of Foods, by C. A. Southwick Jr.

Stock Level and Pressure Recording Indicating and Control, by A. H. Stanton.

Sheet Forming Characteristics on Cylinder Machines, by Philip Goldsmith.

Further Studies in Wire Drainage, by H. G. Specht and C. M. Connor.

Alum, Its Use and Effects, by L. M. Booth.

Properties of Pigmented Papers, by W. R. Willets.

Chloramine Treatment for Slime Control, by R. B. Martin.

Further Studies in Waste Utilization, by L. M. Booth.

The Dual Press, by Beloit Iron Works.

A New Device for Applying Wires to the Fourdrinier Paper Machine, by Beloit Iron Works.

The Vortrap, by Horace Freeman.

Paper Machine Operating Costs, by J. P. Hagenauer.

Studies on the Disc Refiner, by D. M. Sutherland Jr.

Beater Room Control, by W. F. Hoffman.

Defibering Ligno-Cellulose Materials at High Temperatures, by Arne Asplund.

Economic Factors of Refining, by TAPPI Stuff Preparation Committee.

Refining Operating Data, by A. S. Cosler.

Controlled Stock Preparation, by H. K. Williamson.

Operation Data on the Clasifiner, by E. C. Cowles.

Digester Blowdown Condensing Systems, and the Recovery of Heat and Turpentine from Digester Relief, by Pell Foster.

Discussion of the Accepted Methods of Chemical Control in Causticizing Plants, by R. P. Kite.

The Swenson Causticizing System, by W. F. Gillespie.

The Present Status of Air Conditioning Practice, by V. P. Victor.

A Resume of Moisture Control Systems, by the TAPPI Drying, Heating and Ventilating Committee.

Boiler Feed Water Treatment, by Sheppard T. Powell.

Proper Protection of Electrical Circuits in Pulp and Paper Mills, by H. A. Travers.

Sorption of Water Vapor by Papermaking Materials, by C. O. Seborg.

Solubility of Chlorinated Lignin in Alkaline Solutions, by G. C. Arnold, F. A. Simmonds and C. E. Curran.

A Reflectance Method for the Determination of the Rate of Discoloration of Papers and its Application to the Study of Artificial Aging of Sulphate Papers, by J. C. Tongren.

A Photographic Study of the Motion of Fibers and Water in Flowing Fiber Suspensions, by E. O. Bryant and L. A. Moss.

Effect of Digestion on Wood Structure, by A. L. M. Bixler.

A Case Study of Technical Control in a Paperboard Mill, by J. H. Allen.

A Survey of Quality Control and Inspection in Paper Mills, by L. T. Stevenson.

Effects of Impurities and Alkalinity on the Stability of Calcium Hypochlorite, by C. M. Connor.

The Time Cycle Chart in Bleach Plant Design, by W. L. Savell.

The Use of Caustic Soda in the Bleaching of Pulp, by T. W. Toovey and B. L. Shera.

Survey of Corrosion in Kraft Pulp Mills, by TAPPI Materials of Construction Committee.

Characteristics of Sulphite and Kraft Pulps from Blue Stained Southern Pine, by G. H. Chidester, M. W. Bray and C. E. Curran.

Comparison of Sulphite Pulps from Fast Growth Loblolly, Shortleaf, Longleaf and Slash Pines, by G. H. Chidester and J. N. McGovern.

Symposium on Testing the Printing Smoothness of Paper, by TAPPI Paper Testing Committee.

There will be several other papers which will be announced at a later date.

American Writing Heads Dine

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, January 2, 1938.—The sales and department heads of the American Writing Paper Company were entertained at dinner by Thomas Harper Blodgett, chairman of the board, in the Roger Smith Hotel December 28. The dinner followed an all day conference at the general offices of the company which was attended by the sales department, various department heads and representatives from the mid-west and western seaboard. Spokesmen for Mr. Bodgett stated that the conference concerned itself only with sales planning.

London & Krudener Start

Maurice London, formerly vice president, and Robert E. Krudener, formerly Western sales manager, of the Lagerloef Trading Company, Inc., with which concern both were associated for a long number of years, announce the organization of their own company to deal in wood pulp and paper mill supplies.

The new company will operate under the style of London & Krudener, Inc., and will have its headquarters at 52 Vanderbilt avenue, New York. The new firm will also have an office in the Park American Building, Kalamazoo, Mich., where Mr. Krudener will be in charge.

When MASS-PRODUCTION is ACCURATELY Timed

AS THE LOAVES OF BREAD race through the wrapping machinery of a modern bakery each loaf is automatically wrapped and sealed with lightning speed and clocklike precision. The production and delivery schedule of the entire plant depends upon the uniform quality and performance of the paper that feeds this machinery.

The character of any sheet of paper is determined largely by the uniformity, speed and thoroughness with which the excess water is extracted from the web as it is conveyed from the wet end of the paper machine to the drying rollers. And because they do this work best and at lowest cost, HAMILTON FELTS are standard equipment with leading mills that produce papers for specialized industrial uses.

From the thinnest tissue to the heaviest boards there is a Hamilton Felt that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

• Miami Woolen Mills, Established 1858 •

Hamilton Felts are marked by two blue lines full width of the felt and by one shorter blue line midway between them.

Hamilton Felts

Obituary

Isaac C. Blandy

Isaac Cruse Blandy, president of the American Wood Board Co., Schuylerville, N. Y. and organizer of the Blandy Paper Co., Greenwich, Conn., died at his home in Greenwich, December 22, at the age of 71 years.

Blandy was born at Blandy Farm, near Wilmington, Dell. He attended schools in Montreal, Switzerland and the Germantown Academy. At the completion of his studies at Rensselaer Polytechnic Institute, Troy, N. Y., he went to work for the New York Central Railroad and later was associated with the Erie and Lake Shore roads. In 1892, with former Governor John A. Dix, A. W. Hitchcock and D. C. Trondsen, he organized the American Wood Board Co. In 1898, he purchased the Angell & Langdon mill at Center Falls and founded the Blandy Paper Co. of which he was treasurer. He was also associated with the old Liberty Wall Paper Co. of Schuylerville and served as vice-president of the Mohican Pulp and Paper Co. For several years he published a weekly newspaper, *The Commonweal,* at Greenwich.

Mr. Blandy was a director of the Consolidated Electric Co. and of the First National Bank of Greenwich. He was also a member of St. Paul's Episcopal Church and of Ashlar Lodge, F. and A. M. As a breeder of Guernsey cattle he produced some notable livestock during his ownership of Follyland Farm at Greenwich.

Surviving are three sons, a daughter and six grandchildren. Funeral services were held at the home and burial was in Greenwich Cemetery.

D. B. Parsons

Douglas Bond Parsons, head of the Parsons Paper Co., wholesale dealers, of 934 York avenue, N. W., Washington, D. C., died December 18 at Emergency Hospital, following an operation for a ruptured appendix. He was 27 years old.

Mr. Parsons was active in the Epworth Methodist Episcopal Church and was a member of the board of stewards. He was unmarried. Surviving are his father, Frank T. Parsons, of the Bureau of Internal Revenue, his mother, two brothers and two sisters.

Japan Promotes Pulp Manufacture

Japan is mobilizing her industries as well as her armies, and is paying particular attention to the pulp and paper field, according to George M. Murray M. L. A., British Columbia newspaper publisher, who recently returned from an extended business visit to the Orient.

With the Japanese government considering an increased output of lumber in Saghalien and Hokkaido to help the promotion of the five-year pulp production plan, the Mitsubiahi Paper Manufacturing Company and Kanegafuchi Spinning Company are quietly working on a plan to establish a large joint-capital pulp manufacturing company in Hokkaido.

The plan involves a capital of $8,400,000. It is designed to establish a pulp plant in the district of Kitami capable of producing 50,000 tons of pulp a year. The pulp to be produced is expected to be chiefly rayon pulp.

With the government afforestation plan and the fundamental policy of lumber felling still undecided, there is no knowing whether or not the plan will materialize, but an increase of pulp production is considered urgent, and the annual production of $1,950,000 tons five years hence is desired.

Inasmuch as the Mitsubishi-Kanebo plan has been designed by influential companies Japanese government quarters are deeply interested in the plan and expect a great deal of it.

Japanese business men keep well informed upon industrial development in British Columbia. Much pleasure has been expressed by certain paper manufacturers in Japan in the prospect of getting a supply of pulpwood from Queen Charlotte Islands. A technical and industrial newspaper published at Osaka, Japan, carried the following reference in their chemical section to a recent transaction in British Columbia:

"The Hokuetsu Paper Manufacturing Company (Hokuetsu Rayon Pulp) is now assured of a continuous supply of Canadian pulpwood for 10 years. Early last spring the company sent Engineer Miyake to Canada for negotiations at Vancouver Island and elsewhere for investigations and negotiations with the result that a contract with the Canada Lumber Company has recently been concluded.

"Under the contract the Hokuetsu concern will receive 200,000 koku of pulpwood from the Canadian firm annually. The contract runs for 10 years."

To understand the true reasons for Japan's aggression in China, one must look into Japan's exports and imports. China is her best market and Japan has set about to be the manufacturer, distributor and ultimately the banker for China. Into Hong Kong, China and Manchuria she has re-exported most of the paper she has manufactured from British Columbia pulpwood. Persistent Chinese boycotts have cut down her sales to China of paper and wood products along with all her other exports to that land.

Cutting out of Japanese goods has opened a market for Canadian newsprint and Swedish newsprint to China. That Japan believes her military operations in China will be crowned with success is indicated by her plan to invest the equivalent of $10,000,000 (gold) in a pulp and paper plant which will make her more or less independent of British Columbia and other producers of timber and wood-pulp products.

To Improve Crystal Tissue Plant

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, January 3, 1938. — Zeiber W. Ranck, president of the Crystal Tissue Company, announces an improvement program calling for expenditure of $150,000 for new equipment.

The announcement followed close upon the distribution of $11,000 in Christmas bonuses to more than 250 employes.

The improvement program will include the installation of a 2000 k. w. turbine and incidental condensers in a new turbine building to be constructed.

This change will result in the mill machinery using AC current instead of DC power and new AC motors will be installed throughout the factory.

A FLY

could tell you a lot about

PAPER

At right is a "fly's eye view" of a section of a 120-screen halftone illustration, printed on medium-quality magazine stock. The black spots are halftone dots, magnified 75 times.

They say a fly sees things 75 times larger than they appear to the human eye. That means it sees in a printed sheet of paper all those minute imperfections that may affect printing quality.

But it has nothing on Kenwood. Here in the Kenwood laboratory, we get a "fly's eye view" through the microscope—make microphotographs to study finish problems for our customers.

Surface marks result from many causes —rough fibers, wires, just possibly a felt. That's why it's so important to use Kenwood Felts, product of 68 years of increasing effort to make better and better felts for the paper industry

KENWOOD WOOL PRODUCTS

KENWOOD FELTS

F. C. Huyck & Sons · Albany, N. Y.

Tariff Commission Report on Salt Cake

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., January 5, 1938—In its survey of salt cake the United States Tariff Commission sets forth in detail the economic and technical changes that have occurred in the production and consumption of this industrial chemical during the past decade. This is pointed out by the Commission in reviewing the survey in its annual report. In this connection the Commission says further:

Sodium sulphate is marketed in three forms: (1) Crude Sodium sulphate or salt cake, used chiefly as a raw material in the manufacture of sulphate wood pulp, from which kraft paper is made, in the production of glass, especially plate glass, and as a raw material for other industrial chemicals. (2) Anhydrous sodium sulphate, a water-free, refined form used principally in the dye and textile industries. And (3) Glauber salt, a hydrated, refined form used for much the same purposes as the anhydrous product. Because of its greater industrial importance and tariff significance, crude sodium sulphate is considered in more detail in this report than are the refined forms.

As a preliminary to the survey, the Commission obtained, for the first time so far as is known, statistical data as to the quantities of salt cake produced by different methods in the United States; the consumption by different industries; and the consumption, by kinds of cake, in the sulphate pulp industry. This information was obtained through questionnaires to all known producers and importers of sodium sulphate and to all producers of sulphate pulp.

The total domestic production of crude sodium sulphate in 1935 was 200,155 short tons. Of this, about four-fifths was manufactured jointly with other chemicals, chiefly hydrochloric acid. The remainder was mined from natural deposits in the Western States.

The domestic output of "chemical" salt cake (i.e., artificially manufactured) decreased from 209,000 tons in 1927 to 161,000 tons in 1935, chiefly because of increased use of methods for making hydrochloric acid without the incidental production of salt cake, and in part as a result of decreased consumption of those chemicals which are produced jointly with salt cake.

Although immense deposits of natural sodium sulphate are available, no substantial part of the growing American market has been supplied from this source. Development of these deposits has been retarded by a combination of high transportation costs to the consumer and declining prices.

Apparent consumption of salt cake in the United States increased from 177,000 tons in 1925 to 307,000 tons in 1935 largely because of the expanding use in the sulphate pulp industry, which increased its output of pulp more than 100 percent from 1927 to 1935.

By reason of the increased demand and the inability of domestic producers to meet it, imports, largely from Germany, increased from 11,000 tons in 1927 to 110,000 tons in 1935. Virtually all of the imported salt cake is consumed by the sulphate pulp industry, particularly in the Southern and Pacific States. These areas are distant from the centers of production of chemical salt cake in the Middle Atlantic, North Eastern, and North Central States; and the Southern consuming area, especially, is far from natural deposits in the West. Some crude sodium sulphate is imported from Canada into the Lake States for use in the sulphate pulp industry in that area.

The average delivered cost of salt cake to the sulphate pulp industry in 1935 ranged from $12.69 to $15.39 per ton. Transportation costs from producer to consumer in the same year were from $3.25 to $11 a ton.

In the marketing of the refined forms of sodium sulphate, the significant event was the appearance in the East in 1935 of anhydrous sodium sulphate produced from natural depo ts in the West, and competing with both domestic chemical production and imports.

H. & J. Shapiro In New Quarters

H. and J. Shapiro Corporation has moved to 350 Hudson street, New York, where the firm will occupy 46,225 square feet of space in a modern, concrete, fireproof building. Besides its excellent location, the new location offers advantages such as concrete floors of very heavy carrying capacity, interior loading platforms for receiving, and private interior loading platforms that back right into the company's own shipping department, large freight elevators of heavy capacity, and many other facilities that are essential to the handling of large quantities of paper. Open stock will be carried in steel shelves of the newest type. A separate bin has been provided for every item. Spacious and well-planned offices for the various departments have been constructed under the supervision of a prominent firm of architects.

The shipping department has been given special consideration and space measuring 60 by 80 feet was laid out to permit the efficient operation of that department. Considerable study was devoted to the problem of handling open cases of book paper, with the result that special steel racks, designed by construction engineers after the company's own ideas, were installed. These racks will enable the company to place a case of book paper in the racks with the least amount of effort and will avoid the handling of the paper excepting when an order is to be filled. This is important, for its insures delivery of paper in perfect condition, as unnecessary handling of large sizes of coated and uncoated paper is harmful to the paper. Careful planning is evident throughout the place.

A large house warming party is being planned sometime late in January. "By that time, when everything is set in order," says the company, "the trade will see a modern paper house that represents the last word in careful planning for unexcelled service and efficiency, down to the smallest detail." The new telephone number of the Shapiro Paper Corporation is WAlker 5-8800.

May Maintain Rates on Newsprint

WASHINGTON, D. C., January 5, 1938—The interstate Commerce Commission has granted authority, on conditions, to establish and maintain during the period of navigation each year from May 1 to November 30, inclusive, rates on newsprint paper, in carloads, from Donnacona, Quebec, Canada, to Chicago, Ill., without observing the long and short haul provision of section 4 of the Interstate Commerce Act.

Paper Exhibit Gets Good Response

In spite of the handicaps of the holiday season, telegraphic and mail requests are rapidly coming to the office of The National Paper Trade Association by which thirty-five exhibit rooms have been reserved within the first week following announcement of arrangements made for a room exhibit on the 9th floor of the Waldorf-Astoria during the Thirty-fifth Annual Convention of the Association, February 21-23. Even at this early date when few have had time to return their applications for space, an exhibit of a wide range of paper and paper products is assured. Among the earlier participants are the following:

Royal Paper Corporation, Gummed Industries Association, The Racquette River Paper Company, Sherman Paper Products Company, Central Paper Company, Manasha, A. P. W. Paper Company, Wheeler Paper Corporation, C. E. Twombly Company, Dennison Manufacturing Company, Mid-States Gummed Paper Company, North American Pulp and Paper Company, Orchard Paper Company, Allied Paper Bag Corporation, Whitney Brothers, Inc., Crossett Paper Company, Wolf Brothers, American Paper Goods Company, A. W. Archer Company, Inc., Hoberg Paper Mills Company.

It is especially encouraging to those who have felt that this plan would be a big time saver for both manufacturers and merchants that fully half of the applications so far received are from those who did not participate in the Chicago exhibit. This is significant because nearly all Chicago exhibitors expressed the intention of taking space at the New York show if suitable arrangements could be made with the hotel.

Installation of exhibits may begin at 12 o'clock noon, Sunday, February 20. The hotel has arranged to accept deliveries for exhibit purposes between 8:00 A. M. and 7:00 P. M. on Saturday, February 19, to facilitate their handling.

The exhibit floor will be closed to all except exhibitors and members of The National Paper Trade Association and certified guests. Exhibitors and N.P.T.A. members will be provided with appropriate badges or other identification with special identification furnished to guests certified by the Association.

As in Chicago, the Association is preparing to service exhibitors to the fullest possible extent and thus permit the largest number of merchants to cover the show in shortest possible time.

Meeting France's Sulphite Needs

Steps are being taken to supplement France's consumption needs in sulphite pulp. The paper mills in Alsace have been securing their sulphite requirements from Germany, but within the last year or two have experienced some difficulty in obtaining sufficient supplies from that country. As a result of this situation, a sulphite pulp plant has been erected at Strasbourg. The plant, which is located between the Vauban basin and the Petit Rhin, near the Strasbourg power plants, will have an annual productive capacity of 30,000 tons. The company expects to obtain the greater part of the wood locally from the Vosges district, deficiencies to be made up by imports, principally from Russia.

Sydney Ferguson Awarded Scroll

Sydney Ferguson, of G. H. Mead Company, 230 Park avenue, New York, has been awarded a parchment scroll by John W. Davis, chairman of the United Hospital Campaign, in appreciation of his services rendered during the recent appeal to aid the ninety-two voluntary hospitals of New York and the Visiting Nurse Association of Brooklyn.

Mr. Ferguson acted as chairman of the paper industries division of the industry section.

The scroll is signed by Mr. Davis; David H. McAlpin Pyle, president of the United Hospital Fund, and George A. Wilson, secretary of the Fund.

Of the funds needed by the hospitals and the Visiting Nurse Association, more than two million dollars has been raised. This is the largest sum received in any United Hospital Fund appeal in the last fifty-eight years.

Appointed by Walter C. Teagle, chairman of the industry section, Mr. Ferguson organized associates in his field to aid in the appeal. The money raised by his group will be used to provide free care for the needy sick.

Injunction Against Moore & Thompson

[FROM OUR REGULAR CORRESPONDENT]

BELLOWS FALLS, Vt., January 2, 1938.—A dispute over rates between the Moore & Thompson Paper company here and the Bellows Falls Hydro-Electric Corporation, a unit of the New England Power Associates, threatens to close down the paper company unless a satisfactory arrangement can be made.

A temporary injunction has been obtained by the power company to restrain the mill from using more than 300 kilowatts per day and this has for the time being closed the plant as that amount of power is inadequate. The dispute will be aired before Judge Shields in St. Johnsbury, Vt., on January 12. The paper officials claim that the 300 k.w. is being received from the power company in exchange for use of certain water rights transferred to the company several years ago. A new contract has been offered by the power company but the mill owners state that its terms will increase power costs about 60 per cent.

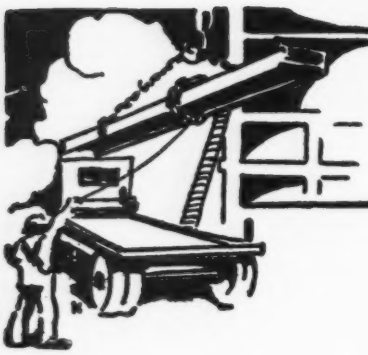
D. G. W. Hollister Elected President

Effective as of January 1, 1938 Dwight G. W. Hollister has been elected president and a director of the A. P. W. Paper Company, Inc. Mr. Hollister has been executive vice-president of this company since May, 1930.

Mr. Hollister is a native of Springfield, Mass., and a graduate of Boston University, College of Business Administration—class of 1919. His residence is in Wellesley Hills, Mass.

The complete list of officers of the A. P. W. Paper Company, Inc., elected as of January 1, 1938 is as follows: Dwight G. W. Hollister, president; F. Gardiner Perry, vice-president and treasurer; Roger W. Bell, general manager; Spencer C. Gunn, secretary; George C. Bishop, assistant treasurer; George W. Browne, assistant secretary.

The Board of Directors comprises the following: Ledyard Cogswell, Jr., chairman of the board; Roger W. Bell, William Holway Hill, Dwight G. W. Hollister, Lewis A. Jones, William Douglas McAdams, Charles J. McCullough.



CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, of Pulp and Paper Mills

General Construction News

Darlington, S. C.—The Dixie-Vortex Company, 24th street and Dixie avenue, Easton, Pa., manufacturer of paper drinking cups and kindred paper specialties, has taken over an industrial building at Darlington and will improve and equip at once for new branch plant. Machinery will be installed for large capacity. New plant will be used for trade in the Southeastern states and is scheduled to be ready for operation at early date. As recently noted in these columns, the company also is establishing another branch plant for Pacific Coast trade at South Gate, Los Angeles, Cal., and will begin production in immediate future. New plan will represent an investment of close to $150,000, and will give employment to an initial working quota of about 100 persons.

Fall River, Mass.—The E. J. Cox Paper Company, 111 Harrison street, commercial paper products, has completed plans for new addition to storage and distributing plant, to be one-story and basement, estimated to cost close to $50,000, with equipment. Superstructure will be placed under way at once. General contract for erection has been awarded to James T. Sampson & Sons, 280 New Boston road, Fall River.

Detroit, Mich.—The Eddy Paper Corporation Three Rivers, Mich., manufacturer of folding box board, bristol board and similar paper stocks, has begun erection of new one-story addition to factory branch, storage and distributing plant at 590 Lycaste avenue, Detroit, recently referred to in these columns and will push work to early completion. New unit unit is reported to cost close to $45,000, including equipment. The Austin Company, Curtis Building, Detroit, is general contractor.

Green Bay, Wis.—The Northern Paper Mills, manufacturer of tissue and other kindred paper stocks, has plans maturing for new steam-electric generating station at local mills and will begin erection at early date. Bids have been asked for steam turbo-generator units and accessories, and for high-pressure boilers, with awards scheduled to be made soon. At later date, contracts will be let for complete auxiliary equipment, as well as for station building. New plant is estimated to cost close to $750,000 and is expected to be ready for operation late in 1938. Sargent & Lundy, Inc., 104 South Dearborn street, Chicago, Ill., is consulting engineer. The power plant will replace two hydroelectric generating stations of the company at White Rapids and Chalk Hills, respectively, located on the Menominee River, vicinity of Amberg, Wis., which have been sold to the Wisconsin-Michigan Power Company, Appleton, Wis., as noted recently in these columns, and will be used for central station service in the future.

New Haven, Conn.—The Also Pulp and Board, Inc., New Haven, recently incorporated with capital of $50,000, plans operation of a mill in this vicinity for the production of paper board products. Company will have a paid in capital of amount noted. Incorporators of new company include Joseph J. Gilger and John J. Fox, both of New Haven.

Middletown, Ohio—The Crystal Tissue Company, manufacturer of tissue, kraft and other paper stocks, has awarded general building contract to B. D. Morgan Company, Middletown, for new power house at mill, recently referred to in these columns and for which superstructure will be placed under way at once. It will be one-story, 49 x 56 feet. Awards for turbo-generator unit, condenser and other equipment were made recently. It is expected to have the new unit ready for service early in the spring. No estimate of cost has been announced. Walter I. Barrows, Reibold Building, Dayton, Ohio is consulting engineer.

Memphis, Tenn.—B. B. Johnson & Sons Company, Jackson, Tenn., Commercial paper goods, has leased a one-story building at Madison and Manassas avenues, Memphis, and will remodel and improve for new branch plant, including lithographing department. Work will be placed under way and building will be made ready for equipment installation at earliest date. No estimate of cost has been announced.

Minox, Pa.—The United States Corrugated Fibre Box Company, 1409 Roosevelt avenue, Indianapolis, Ind., manufacturer of corrugated fiber boxes and containers, has plans maturing for proposed new branch plant on site near Minox, Clarion County, Pa., to be one-story, 60 x 200 feet, reported to cost about $60,000, with equipment. As previously noted in these columns, superstructure will be placed under way early in 1938.

Hamilton, Ont.—The Consolidated Salesbook and Wax Paper Company, 800 Burlington street, East, manufacturer of commercial paper products, waxed and other processed papers, has awarded general contract to the Cooper Construction Company, Medical Arts Building, Hamilton, for new plant unit to replace a structure recently destroyed by fire, as previously reported in these columns. It will be one-story, 100 x 175 feet, with two one-story wings, 25 x 55 feet, and 15 x 35 feet, respectively. New plans

will cost over $125,000, with equipment. W. J. Walsh, 128 King street, Hamilton, is architect. L. M. Appleford is general manager.

Hamden, Conn.—The New Haven Paper Box Company, 214 East street, New Haven, Conn., manufacturer of paper boxes, cartons, etc., has engaged Charles H. Abramowitz, New Haven, architect, to prepare plans for proposed new plant on site lately acquired at Welton and Benton streets, Hamden, as reported in these columns. Details of new plant and estimates of cost will be determined at early date, when bids will be asked on general erection contract. Benjamin Ledewitz is president.

Krefeld, Germany—Rhenische Kunstseide, A.G., recently organized with capital of 7,400,000 marks (about $2,960,000), to manufacture cellulose rayon products, has plans under way for construction of a new mill on local site, consisting of several one and multi-story units, to be equipped for an initial capacity of about 3500 tons per annum. A power house, pumping station and other mechanical structures will be built. It is proposed to begin work at early date. Entire project is reported to cost over $1,000,000, with equipment.

Doncaster, England—The Ebruite Corrugated Containers, Ltd., manufacturer of corrugated paper and other containers, cartons, etc., is completing plans and will take bids soon for the construction of a new plant on local site, consisting of several one and multi-story units, to be equipped for large capacity. It is expected to have work under way in 60 to 90 days. Cost estimated over $400,000, including equipment.

Barnoldswick, England—Walker, Reid & Co., Ltd., Dunfermline, Scotland, manufacturer of rayon products, has taken over large mill property at Bankfield Shed, Barnoldswick, formerly used as a textile mill, and will convert for cellulose rayon production. Structure will be remodeled and improved, and new equipment installed, providing facilities for employment of about 200 persons, later to be increased to practically double such working force. Entire project is reported to cost over $100,000, including equipment.

Hulme, England—J. Maclaren Ross, 11 Victoria street, Westminster, S.W., London, England, architect, has plans under way for construction of a new mill for the manufacture of paper products at Hulme, for a company whose name is temporarily withheld. It will consist of several one and multi-story units, with power house, pumping station, machine shop and other mechanical departments, estimated to cost close to $800,000, including equipment. Work on project is scheduled to begin in about 60 days. Architect noted will be in charge.

New Type Proportioning Machine

D. W. Haering & Co., Inc., 3408 Monroe street, Chicago, announce development of a new type proportioning machine employing the Haering fluid piston principle for the proportioning of mixtures of suspended matter. The Feeder is equipped with an agitator installed in the reagent compartment which is so designed and installed as to permit the continuous agitation of the reagent without danger of emulsifying the oil. Heavy suspensions of lime and similar chemicals can be carried in suspension and proportioned accurately through this unit.

PLANS FOR LARGER PRODUCTION

(Continued from page 15)

intentions of the administration will continue to have a stagnating effect until these suspicions are removed.

"We have found over an experience of many years that our business follows the general trend of the country. However, we have been developing different items from year to year so that our normal increase should improve our situation even though business in general is slow in picking up."

Nekoosa Adds Mill Supplies Dept.

An industrial supplies department has been added to the Nekoosa Foundry and Machine Company, Nekoosa, Wis., and within a few weeks a complete line of mill supplies will be offered paper mills in central and northern Wisconsin, according to Ted Olson, manager. G. E. Marvin has been employed as the company's travelling representative.

Expansion projects of mills in and near Wisconsn have made it necessary for the company to enlarge its operations, and more than a normal amount of equipment, including barkers and other machines, has been shipped to new mills under construction in the south and on the west coast. The plant has been operated on day and night shifts, and the force has been increased from 60 to 100 workers. Sufficient orders are on hand for capacity operations for two months, and numerous inquiries for equipment are expected to develop additional new business. Mr. Olson says the company has been obliged to refuse some new business in order to be in a position to supply its regular customers.

Two small additions have been made to the plant during the last year. New machinery has been installed, including lathes, drill presses, and boring bar and electric welding equipment.

Whiting-Plover Give Xmas Bonuses

Christmas bonues were paid to 226 employes of the Whiting-Plover Paper Company, Stevens Point, Wis. Those employed ten years or more received the equivalent of one week's pay on a five-day basis. Those on the payrolls two to ten years received four days' pay, and all others with the company less than two years were paid a 3-day bonus.

F. C. Huyck & Sons May Raise Own Wool

RENSSELAER, N. Y., January 3, 1938.—Announcement is made here that F. C. Huyck & Sons has adopted a plan under which it plans to raise its own wool on an experimental sheep farm in Livingston County. The plan to substitute domestic wool for the product now drawn by the company from various parts of the world was made public by H. M. Ashby, president. Effects of the high prottective tariff placed on foreign wool are believed to have hastened the company's action towards the plan which will means a thriving new industry for the state. The experiment has been set up on the basis of a ten-year period which should be long enough to reflect average business conditions and also to allow for proper development as to pastures, breed and other conditions involved in starting. The company will supply the funds and the farm will be supervised by the State Agricultural School at Cornell and executives of the local concern.

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COMING EVENTS IN THE PAPER INDUSTRY

AMERICAN PAPER AND PULP ASSOCIATION, Sixty-first Annual Convention and meeting, Waldorf-Astoria Hotel, New York. February 21-25.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Convention, Waldorf-Astoria Hotel, New York, February 21-24. Annual Luncheon, Waldorf-Astoria Hotel, Wednesday, February 23.

SALESMEN'S ASSOCIATION OF THE PAPER INDUSTRY, Annual Meeting and Luncheon, Waldorf-Astoria Hotel, New York, Tuesday, February 22.

NEW YORK ASSOCIATION OF DEALERS IN PAPER MILLS' SUPPLIES. Annual Banquet, Hotel Commodore, New York, February 23.

NATIONAL PAPER TRADE ASSOCIATION OF THE UNITED STATES, Convention, Waldorf-Astoria Hotel. New York. February 21-23.

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Nonotuck Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—Second Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION, Technical Association of the Pulp and Paper Industry— Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION, Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park-American Hotel, Kalamazoo, Mich.

AMERICAN PULP AND PAPER MILLS SUPERINTENDENTS ASSOCIATION. Annual meeting, Royal York Hotel, Toronto, Ont., June 22-24.

CANADIAN PULP AND PAPER ASSOCIATION. Annual meeting. Windsor Hotel, Montreal, Que. January 26-28.

THE BUSINESS RECESSION

Despite the severe decline in industrial production in the second half of this year the business record for 1937 is an excellent one. According to Government estimates over five billion dollars was spent in Christmas buying, which was slightly above that of last year. In the paper industry, the heavy demand for newsprint has been one of the outstanding features. In commenting on the large consumption of this commodity the Chamber of Commerce of the United States, on December 24, said: "Continued heavy demand for standard newsprint paper resulted in a new high mark for nine-month imports, which amounted to 4,826,203,000 pounds, exceeding the 1936 record by 23 per cent and the five-year average by 54 per cent."

Although the lay-offs in industry have resulted in the loss of more than one million jobs, according to the estimate of the American Federation of Labor, the same source stated that the purchasing power of workers was sustained by an average earning in industry of 65.3 cents an hour for October, compared with 58.2 cents an hour for the corresponding period last year. It is estimated that the monthly earnings of wage and salaried workers for October amounted to one hundred million dollars more than a year ago.

In commenting on the decline in business, Marriner S. Eccles, chairman of the board of governors of the Federal Reserve System, in an address at the annual meeting of the American Farm Bureau Federation at Chicago, December 14, said in part: "From 1934 up to the last quarter of 1936, we had an orderly recovery movement. The index of industrial production moved gradually upward from 86 in December 1934, to 110 in October 1936, while the index of pay rolls rose 39 per cent in the same period. Wholesale commodity prices remained practically unchanged, so that the expansion in the national income from 1934 to 1936 of some 14 billion dollars represented not merely more money received by our people, but an increase in the amount of goods that they could purchase.

"The orderly character of the recovery movement underwent a drastic change in the final quarter of 1936 and in the six months following October of last year prices began to rise rapidly. Among the factors contributing to the upsurge in costs, prices and inventory buying, were the bonus payments coming on top of already heavy Government expenditures and giving a sharp additional impetus to consumer buying. The organizing campaign of labor, together with the drive for higher wages and shorter hours, added to expectations of higher prices. The rearmament program in various countries contributed to the general inflationary sentiment. A seller's market developed and widespread advantage was taken of it to increase prices. Other factors may have been contributory in some degree, but the more I have considered other explanations, the more I have been led to the conclusion that the cost and price advances of last winter and spring were the principal causes of the subsequent downturn.

"There are critics who contend that monetary policy has been primarily responsible for the present recession. They think that sterilization of incoming gold by the Treasury and the actions of the board of governors of the Federal Reserve System in increasing the reserve requirements of member banks caused a reversal of the upward movement. I cannot find convincing evidence to support this analysis.

"The basic causes of the present situation are not to be found either in the capital gains tax, the undistributed profits tax, or in monetary policy, but in the rapid price and cost advances of last winter and spring. How are we to achieve and maintain full employment if private groups and organizations raise prices and costs whenever increased demand appears.

although there is still an abundance of idle and unused man power, plant facilities and raw materials? Does this necessitate steady increase in consumer buying power through deficit spending? Are we to attempt to return to a truly competitive laissez faire economy? If not, are the alternatives facing organizations of capital and labor either self-government in the public interest or increased regulation in the public interest?

"I earnestly hope they will choose the former alternative. Rather than attempt to revert to earlier forms of organization, it seems to me that our best hope lies in developing that form of organization for capital and labor which will best further the public interest. Thought must also be given to the best form of organization that will insure an adequate representation of the public interest involved in price, wage and production policies.

"Two of the principal causes of the recession were excessive inventory accumulations and the failure of building construction, railroad and utility expenditures to increase sufficiently to offset the decline in the Government's contribution to community buying power. Considerable progress has been made since September in rectifying the inventory situation. Production has declined much more rapidly than consumption. If consumer buying can be sustained, we may be hopeful that production may soon begin to increase. Local, state and Federal provisions for the unemployed afford a support to consumer buying that was lacking prior to 1933.

"At the same time, it is highly desirable for business men, both in their own and in the public interest, to review carefully their present and prospective inventory, plant and equipment requirements. Further curtailment of expenditures for these purposes at the present time will mean that many lines of business will be physically unable to meet the orders that will come to them when the recovery movement is resumed. I feel that the Government in its policy of taxation must adapt itself to changes in the national income created by private enterprise and, finally, I feel that the monetary authorities should exert their efforts to keep the availability, supply and cost of money at such a level as to encourage continuous expansion of the real income of the nation in goods and services and to prevent or moderate an expansion of monetary income in excess of the nations' productive capacity."

Bleyco Paper Corp. to Move

The Bleyco Paper Corporation, manufacturer of paper specialties, 226-28 Wooster street, New York, will during the early part of January move to larger quarters at 72 St. Edwards street, Brooklyn.

At the new location the company expects to add many new items to the ones which it already manufactures.

Production Ratio Report

(These statistics are based upon paper production reports to the American Paper and Pulp Association.)

COMPARATIVE MONTHLY SUMMARIES

Months	1937	1936	1935	1934
January	90.3% (c)	76.1%	65.8%	.....
February	90.1% (c)	77.9%	70.0%	.....
March	90.3% (c)	76.0%	70.5%	.....
April	92.1% (c)	82.3%	70.0%	.....
May	90.6% (c)	81.6%	69.4%	.....
June	87.3% (c)	80.7%	72.3%	.....
July	81.8% (c)	77.3%	64.9%	.....
August	82.9% (c)	81.5%	70.9%	.....
September	78.6% (c)	80.5%	71.9%	58.2%
October	73.5% (c)	87.6%	75.6%	64.7%
November	62.4% (c)	88.0%	75.3%	61.7%
December	.....	85.9%	71.2%	59.6%
Year Average.	.....	81.3%	70.5%	.....
Year to Date, First 51 Weeks	81.5%	81.3%	70.8%	.....

COMPARATIVE WEEKLY SUMMARIES

Current Weeks, 1937		Corresponding Weeks, 1936	
* November 20	62.1%	November 21	89.4%
* November 27	57.7%	November 28	87.9%
* December 4	60.6%	December 5	90.3%
* December 11	55.8%	December 12	93.3%
* December 18	57.7%	December 19	94.4%
* December 25	(h) 45.7%	December 26	(h) 66.5%

The following statistics show the number of mills reporting by ratio groups:

NUMBER OF MILLS REPORTING, CURRENT WEEKS

Ratio Limits	Nov. 20 1937	Nov. 27 1937	Dec. 4 1937	Dec. 11 1937	Dec. 18 1937	Dec. 25 1937
0% to 50%	130	185	142	163	145	143
51% to 100%	187	127	173	153	155	86
Total Mills Reporting	317	312	315	316	300	229

* Subject to revision until all reports are received.
(c) Basic capacity data have been adjusted to correspond with ratings reported by individual companies.

Paperboard Operating Returns

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours", were as follows:

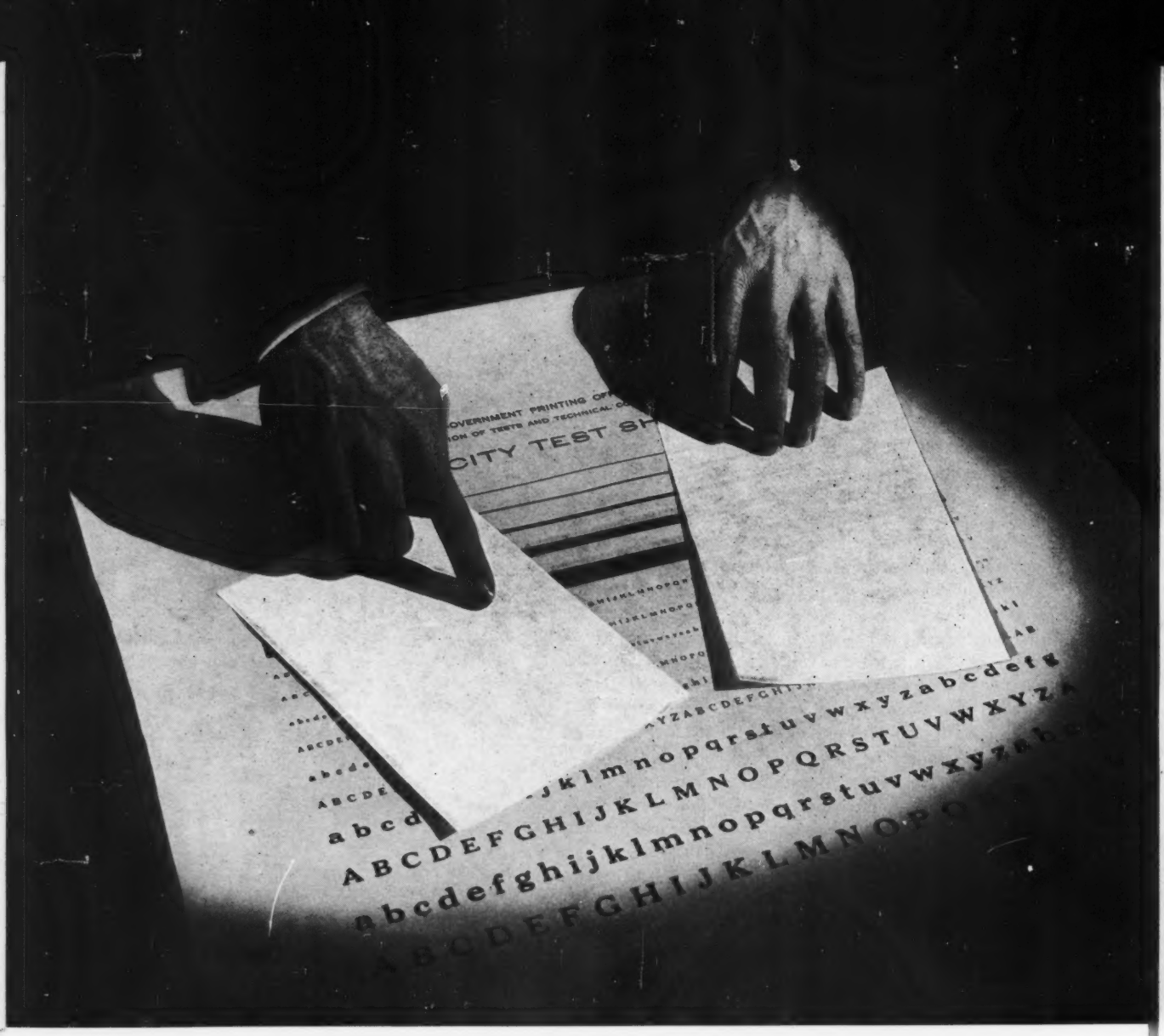
Months	1937	1936	1935	1934
January	80% (e)	61%	61%	....
February	86% (e)	67%	67%	....
March	87% (e)	68%	67%	....
April	89% (e)	70%	61%	....
May	86% (e)	68%	61%	....
June	75% (e)	68%	65%	....
July	67% (e)	69%	59%	....
August	74% (e)	75%	65%	....
September	70% (e)	76%	69%	62%
October	66% (e)	82%	76%	63%
November	56% (e)	79%	70%	56%
December	....	74%	60%	52%

Week ending November 20, 1937	56%
Week ending November 27, 1937	50%
Week ending December 4, 1937	50%
Week ending December 11, 1937	53%
Week ending December 18, 1937	51%
Week ending December 25, 1937	48% (h)

(e) Basic figures revised to include new members of the National Paperboard Assn.
(h) Holiday week; percentages based on six days' operation.

United Kingdom Imports More Pulp

Imports of wood pulp into the United Kingdom for the 10 months ended October 30, reached a total of 1,444,789 tons, this figure representing an increase of 12 percent over the corresponding period last year. All classes contributed to this gain, the largest increases having occurred in mechanical pulp and blanched chemical pulp. Imports of the various classes during the period mentioned were as follows: dry, bleached, chemical pulp 158,413 tons: dry, bleached, chemical pulp 496,337 tons: wet, chemical pulp, bleached or unbleached 181,949 tons (dry weight): mechanical pulp 608,090 tons. Finland supplied 43 percent, Sweden 29 percent, and Norway 17 percent of the 1937 imports. Approximately 2 percent of this year's imports came from Canada



"Now there's an OPAQUE sheet"

Salesmen are encountering many comments such as this when offering the new improved lines—more opaque, whiter and brighter papers that arouse enthusiasm among paper dealers, printers and consumers.

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The trade is looking for these qualities. . . . Our Technical Service Department is ready to cooperate with you on any phase of this development.

New Jersey Zinc

THE NEW JERSEY ZINC COMPANY 160 FRONT STREET, NEW YORK

ZINC SULPHIDE PIGMENTS IN PAPE

Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

The Specific Heat of Sulphite Waste Liquor

By Kenneth A. Kobe [1] and William McCleave[1]

The specific heat of sulphite waste liquor is of importance in the design and testing of equipment used for the concentrating of the waste liquor. In this work the specific heat from 25 to 95 deg. C. has been determined for different concentrations of solids and also for liquor at the lime point. The results have been tabulated and shown graphically.

Apparatus

The calorimeter was a 200-cc. wide-mouth Dewar flask, through the stopper of which passed the heating element, thermometer, and stirring rod. The heating element consisted of one meter of number 28 constantan wire threaded through a fine glass tube wound in a spiral 1.25 inches in diameter by 2 inches in length. The instruments used were calibrated against standard instruments. The water equivalent was obtained by measuring the electrical input with 100 or 150 gram of water in the calorimeter. The apparatus and technique are described in greater detail in other articles *(1, 2)*.

Sulphite waste liquor from the pulping of western hemlock was obtained from the Soundview Pulp Company at Everett, Wash. It was removed from the digester just before it was blown and contained 12.3 per cent solids. Portions of this original liquor were evaporated in a Klason flask under vacuum. The temperature was never higher than 50 deg. C. to insure against caramelizing the sugars. A sample of the original liquor was neutralized to the lime point *(3, 4)* at pH of 9.2 with calcium hydroxide. The precipitated calcium sulphite was filtered off and the specific heat of the solution determined.

The specific heat of each sample of liquor was determined over 10 degree intervals throughout the range 25 to 95 deg. C. Thus the mean specific heat over the range 25 to 35 deg. C. is called the average specific heat at 30 deg. C. The results are given in Table I.

TABLE I.—SPECIFIC HEAT OF SULPHITE WASTE LIQUOR.

Temp. deg. C. Per Cent Solids	30	40	50	60	70	80	90	Average
12.3	0.922	0.915	0.918	0.920	0.928	0.923	0.929	0.92
Lime point	0.923	0.917	0.921	0.924	0.928	0.923	0.929	0.92
33	0.835	0.832	0.822	0.845	0.854	0.856	0.858	0.85
48	0.781	0.781	0.799	0.805	0.804	0.800	0.795	0.79

When the specific heat is plotted against temperature the points are on a straight line which is almost horizontal. These values may then be averaged to give the specific heat as a function of temperature. The results are shown in Fig. 1.

The results are on a straight line whose equation has been determined as:

$$C = 0.97 - 0.004\ S$$

where

C = Specific heat of liquor cal/g, or Btu/lb.
S = per cent solids

This equation represents the results in such a manner as to be most useful to the engineer engaged in design and testing of evaporators. Its accuracy is more than sufficient for these purposes.

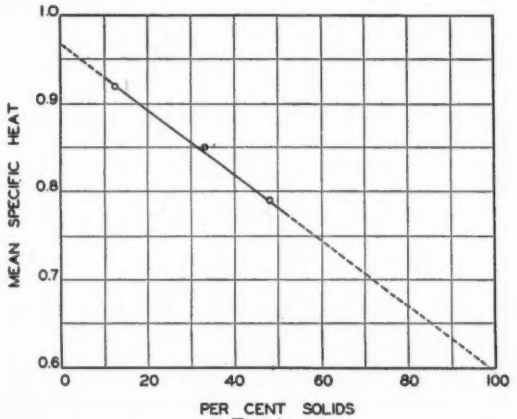

FIG. 1.
Mean specific heat of sulphite waste liquor.

Literature Cited

(1) Kobe and Anderson, *J. Phys. Chem.* 40, 429-34 (1936).
(2) Kobe and Sheehy, *Ind. Eng. Chem.*, to appear.
(3) Leitz, Sivertz and Kobe, *Pacific Pulp and Paper Ind.* 9, No. 6, 10-13 (1935).
(4) Kobe, Layman and Armbruster, *Ind. Eng. Chem.* 28, 571-2 (1936).

[1] Department of Chemical Engineering, University of Washington, Seattle, Wash.

New Hose Bulletin by Manhattan

Users of hose will be interested in a four page illustrated folder recently issued by The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Passaic, N. J. The new folder, in addition to showing a great many actual and unusual installations of Manhattan and Condor Hose being used in wide range of different industries, also contains a detailed description of the types of construction of Manhattan Hose and helpful technical data.

Review Of The Paper Industry Literature

Abstracts Compiled By the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson and Clarence J. West, Chairman of the Committee.

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Raw Materials

Studies on Wood. N. J. Sundstedt. Svensk Pappers-Tidn. 40, no. 5:107-11 (March 15, 1937); B.I.P.C. 7:322. When spruce wood is stored under water in unbarked condition a layer is formed on the surface of the log which cannot be disintegrated. The rate of formation depends upon the temperature of the water. The same kind of layer is also formed when wood barked in the forest is stored under water for a longer period. These layers yield large quantities of extracts; they become enriched in certain substances which causes a decrease of the permeability of the cell wall and makes disintegration impossible. When the layers are treated with a mixture of methanol and sulfuric acid, certain color reactions take place which the author believes are caused by rosin and tannic acid.—C.J.W.

Poplar Hybrids. Ralph H. McKee assignor to McKee Poplar Reforestation, Inc. U. S. plant pats. 207 (Nov. 17, 1936); 211 to 218 (Jan. 5, 1937); 225 and 226 (Jan. 19, 1937); 228 to 230 (Jan. 26, 1937). —This group of 14 patents covers a series of new hybrid poplars bred from various parents. These are the ones selected from the 16,000 hybrid poplar seedlings originally produced as most useful for lumber and paper pulp. Their chief characteristics are cheap and easy vegetative propagation, 90% viability, rapid growth of about 1 in. diameter and 5 to 7 ft. height per yr., ready to cut for paper pulp in 8 to 10 yr., fiber longer than in parents or in *Populus tremuloidcs,* and high resistance to disease. The preferred method of propagation is described in McKee's U. S. pat. 1,943,030.—A.P.-C.

Method and Means for Transporting Logs. Albert M. Gilley. U. S. pat. 2,075,711 (March 30, 1937).—Logs are laid in tiers on a scow, the logs being arranged in separate groups. Each outer group is provided with an independent bridle anchored to the deck of the scow adjacent to the edges thereof the inner groups are provided with similar bridles which likewise are anchored to the scow adjacent the same edges. The entire load is bound to the scow as a unit and the bridles are tensioned to secure the load better. When the scow is to be unloaded the binder is removed and the groups of logs are rolled off by pulling on the loops of the bridles one at a time.—A.P.-C.

Mulberry Tree as a Paper Material. Raffaele Sansone. Paper Industry 19: 64-66 (April, 1937).—By crushing mulberry twigs under heavy rolls the twigs are flattened and considerable separation of the bark from the wood is effected; long thick filaments can be obtained by treating the bark with an iron comb or card. The filaments can be used directly for the production of a board of considerable strength, or can be subjected to alkaline treatment, with or without bleaching, for the production of various grades of strong and fine papers.—A.P.-C.

Cellulose and Lignin. The action of chemical reagents upon cellulose. Hugo Probosct. Zentr. Papierind. 55, no. 7: 75-9 (April 1, 1937); B.I.P.C. 7:297. The author describes the reaction of chemically pure cellulose, with cuprammonium, water under different pressures, alkalies, different acids, salts, and oxidation agents. Brief reference is made to cellulose saccharification and colloidal slimes as formed in the beater.—C.J.W.

Heterogeneity of Linters, Sulphite Pulp and Viscose. R. S. Neiman, Z. Rogovin, and R. Obogi. Org. Chem. Ind. (U. S. S. R.) 2:461-464 (1936); C. A. 31:3263.—The heterogeneity of cellulosic materials is determined by fractional solution in aqueous sodium hydroxide at various temperatures and in cuprammonium solution of low copper content.—C.J.W.

Machinery

Paper Machine Conversion Losses. John P. Hagenauer. Paper Trade J. 104, No. 9: 33-35 (March 4, 1937).—An analysis of data furnished by a number of United States mills to the Cost-Engineering Service of the American Paper and Pulp Association during the past 15 months, showing staggering losses as to quantity and value.—A.P.-C.

Development and Refinement in Design of Paper Machines. G. A. Peterson. Paper Trade J. 104, No. 8: 149-150 (Feb. 25, 1937).—A brief outline of modern developments and refinements.—A.P.-C.

Prevention or Elimination of Froth in the Manufacture of Paper. H. Voss, R. Fromm and J. Mau. Brit. pat. 456,572 (June 12, 1936).—Small quantities of an aqueous sol of vegetable phosphatides are added to the stock, at the outset or only on the occurrence of the froth.—A.P.-C.

Factors Influencing Drainage Through Fourdrinier Wires. Harry Specht. Paper Trade J. 104, No. 8: 108-114 (Feb. 25, 1937).—Rate of drainage changes with the acidity of the stuff on the wire; it is maximum at a pH or about 5.3 and decreases more rapidly above than below this value. The rate of drainage is greatly affected by temperature, and generally follows closely the viscosity curve of plain water. There is a critical or maximum pH point for freeness for each type of furnish. Wires can be correlated in regard to freeness. The rate of drainage of the stock varies with the wire mesh.—A.P.-C.

Paper Making Apparatus. John Campbell assignor to International Paper Co. Can. pat. 361,375 (Oct. 27, 1936).—Structural details are described for depositing fibrous stock on a forming wire and introducing vibrations transverse to the moving stock at a frequency in excess of 20 vibrations per sec., and subsequently in a horizontal direction, the amplitude of vibration being maintained below 0.050 in.—A.P.-C.

Machines for Calendering or Drying Paper, Etc. David Bridge and Co., Ltd., and John G. Bradshaw. Brit. pat. 453,625 (Sept. 15, 1936).—The concave

bed is formed by a steel sheet to the back of which are welded intermediate and end semicircular ribs that carry supports for a number of semicylindrical steel sections that are welded thereto and are spaced from the sheet, whereby a number of semicylindrical cavities are formed.—A.P.-C.

Device for Indicating the Elongation of Webs in Paper Machines. David Russell. Brit. pat. 453,240 (Sept. 8, 1935).—A pointer of a dial responsive to the difference of speed of rolls indicates the elongation of the web, e.g., between the couch roll and the first press.—A.P.-C.

Economics of Speed and Width on News Print Machines. E. M. Little. Pulp Paper Mag. Can. 38: 152-153 (1937).—Trends in news print machine design as these were indicated 12 to 15 years ago, in relation to width and intended operating speed, are reviewed. Comparison of cost of manufacture, including certain items of overhead expense, are made for representative types of news print machines, based on actual operating records and other data established by experience. Indications regarding probable future trends in size and speed are noted. —A.P.-C.

Wire Vacuum Box Design and Operation. J. O'Halloran. Pulp Paper Mag. Can. 38: 179-188 (1937).—Variations in present-day practice as regard design and operation of vacuum boxes or flat boxes are discussed. A method of conducting operating tests on flat boxes of a news print machine is described and the results obtained are tabulated. A method of determining power absorbed by friction of the wire or flat boxes is described; the coefficient of friction varies during the life of the wire; the effect of dressing of covers on friction is shown. From data covering six machines it is shown that average pressure between wire and covers multiplied by total distance travelled by any point in the wire over the covers during its life is a constant.—A.P.-C.

Drainage Measurements on a Paper Machine Wire at Various Points. Arthur A. Scott. Pulp Paper Mag. Can. 38: 172-178 (1937).—A detailed description of a method used for measuring the flow of liquid and fiber through a high-speed paper-machine wire at each table roll and suction roll and at the couch, together with results obtained in six such tests.—A.P.-C.

A Theory of Drainage in Relation to the Wire Section of the Paper Machine. E. Cowan. Pulp Paper Mag. Can. 38: 85-91, 199-200 (1937).—Formulas are deduced for calculating the drainage of water from the table rolls and from the suction boxes of a paper machine. Application of the formulae to the calculation of the drainage on the machine on which Scott measured drainage experimentally (preceding abstract) gave results in close and consistant agreement with the experimental values, showing the soundness of the theory on which the formulae are based and confirming the accuracy of the experimental determinations.—A.P.-C.

Progress Made in the Manufacture of Artificial Silk and Cellulose Wool. Hans Radestock. Papier-Fabr. 35, No. 6: 41-45 (Feb. 5, 1937).—Discussion of new machinery and new methods.—J.F.O.

Process and Device for the Barking and Cleaning of Wood Logs. Felix Gobl, Hannover. Ger. pat. 635,913 (July 24, 1934).—J.F.O.

Process and Device for the Cleaning and Barking of Wood Logs. Felix Gobl, Hanover. Ger. pat. 638,093 (May 12, 1934).—J.F.O.

Process for the Cooking of Pulp. A. Bol, A. Ekströms Maskinaffär, Stockholm. Swed. pat. 87,981 (Aug. 20, 1929).—Method and device for circulating the cooking liquor and gases.—J.F.O.

The Broadening Out of the Multiple Motor Electric Drive on Paper Machines. F. Schiller. Zellstoff u. Papier 17, No. 3: 109-113 (March, 1937). —The author presents statistics showing the growth of multiple motor electric drives on paper machines throughout the world. Almost fifty per cent of these drives are located on the American continent where the event of high speed machines made necessary the use of multiple drives.—J.F.O.

Laying Device With Driven Jogging Plates for Diagonal Cutters. Jagenberg Werke Akt. Ges. Dusseldorf. Ger. pat. 636,986 (June 24, 1936).—J.F.O.

Method for Cutting by Pressure or the Method for Cutting by Circular Shearing. W. Strahringer. Wochbl. Papierfabr. 68, No. 8: 142-143 (Feb. 20, 1937).—The author challenges a previous article on the subject, and in a table lists the advantages and disadvantages for each type of cutter.—J.F.O.

The Latest on Soft Rubber Shaft Bearings With Water Lubrication. E. G. Drautz. Wochbl. Papierfabr. 68, No. 9: 162 (Feb. 27, 1937).—Description of the bearing and its uses.—J.F.O.

A Few Pointers on Wire Mending. Wochbl. Papierfabr. 68, No. 11: 210 (March 13, 1937).—Mending a wire which has had considerable wear.—J.F.O.

Bearing Metal for All Uses in the Paper Industry. Ruckert. Wochbl. Papierfabr. 68, No. 12: 229 (March 20, 1937).—Description of the bearing metal and applications of same.—J.F.O.

Mill Results With the Phase Correcting Condensers for Improving the Power Factor. A. Eberhardt. Wochbl. Papierfabr. 68, No. 12: 246-249 (March 29, 1937).—Curves are given to show the improvement in actual mill operation.—J.F.O.

Shake of the Wire on Fourdrinier Paper Machines. K. Schonermann. Zellstoff u. Papier 16, No. 12: 583-587 (Dec., 1936); 17, No. 1: 13-17 (Jan., 1937).—The theory of the shake is first discussed by the aid of mathematics and curves. The various types of shake are all described in detail.—J.F.O.

Suction Rolls. N. Wunderlich. Zellstoff u. Papier 16, No. 12, 589-593 (Dec., 1936).—The disadvantages of the old type couch roll with the press above are related, and then the advantages of the suction couch. Suction presses and also suction roll for the first wet felt are described in detail with aid of several drawings.—J.F.O.

Power and Heat Management During the Year 1936. Konrad Weiss. Zellstoff u. Papier 16, No. 12: 593-595 (Dec., 1936); 17, No. 1: 17-21 (Jan., 1937).—High pressure boilers have now proven their superiority in all respects and because of their heat economies are replacing low pressure boilers. The author discusses new types of boilers and things new in the line of the auxiliaries.—J.F.O.

Slitting Machine. Jagenberg Werke Akt. Ges. Dusseldorf. Ger. pat. 637,117 (July 8, 1934).—J.F.O.

Process for the Manufacture of Designs on Paper. I. G. Farbenindustrie Akt. Ges. Frankfurt a.M. Ger. pat. 637,152 (March 16, 1935).—The de-

signs are manufactured in the paper by having a stronger de-watering of the sheet wherever desired so that the fillers or dyes are completely or partially removed from the paper.—J.F.O.

Process and Device for the Manufacture of an Endless Wire Web, Especially Paper Machine Wires. Ferdinand Steinhart, Munich. Ger. pat. 638,171 (Nov. 13, 1934).—J.F.O.

Miscellaneous

Utilization of Waste in the Pulp and Paper Industry. Chem.-Ztg. 61, No. 6: 73-75 (Jan. 20, 1937).—The article reviews the unsolved problems of waste and its utilization in the pulp and paper industry, barking and fiber losses, waste liquor, particularly the disposal of sulfite waste liquor, waste heat, and wet and dry broke offering great possibilities for further economies.—C.J.W.

Birch and Other Hardwoods for Fuel. E. S. Fellows. Pulp Paper Mag. Can. 38: 141-144 (1937).—A discussion of the possibility and advantage of using hardwoods for fuel in the pulp and paper industry.—A.P.-C.

Flue Gas Analyzers. Anon. Papeterie 59: 109-117 (Feb. 10, 1937).—A description of the instruments built by Cie. pour la Fabrication des Compteurs, and sold by Lhomme et Argy, Paris.—A.P.-C.

Water Purification to Meet Paper Mill Requirements. A. S. Behrman. Paper Trade J. 104, No. 8: 142-146 (Feb. 25, 1937).—A discussion of methods available at the present time for purifying water to the degree required in the manufacture of various grades of pulp and paper.—A.P.-C.

Problem of Paper Mill Modernization. Frederic G. Clark. Paper Trade J. 104, No. 8: 126-141 (Feb. 25, 1937).—A general discussion of the conditions that make many paper mills unprofitable and of the manner in which some of these conditions may be corrected.—A.P.-C.

A Brief Survey of Management Methods in Paper Mills. Sanford E. Thompson. Paper Trade J. 104, No. 10: 31-36 (March 11, 1937).—An outline of some of the basic principles and methods adopted as best present practice of management methods in the pulp and paper industry, showing the recent developments of the industry in processing, in machinery, and in control equipment, and particularly the remarkable advance in technical research.—A.P.-C.

Maintenance With the Metallizing Process. R. A. Axline. Paper Trade J. 104, No. 8: 155-157 (Feb. 25, 1937).—A brief description of the metallizing process and equipment, with particular emphasis placed on the developments of the last few years in the field of new equipment and improved operating technique. Of particular interest to the paper industry is a summary of reports from various mills using the process, listing specific applications of and uses for metallizing. The metals used and service records are given where available.—A.P.-C.

TAPPI Notes

The Ohio Section of the Technical Association of the Pulp and Paper Industry will meet at the Anthony Wayne Hotel, Hamilton, Ohio at 6:30 P. M. Saturday, January 8, 1938. Following the election of officers the speakers will be R. G. Macdonald, secretary-treasurer of TAPPI; Clarke Marion, vice president, Champion Paper and Fibre Company; Henry Keller, engineer, Link-Belt Company and Robert A. Diehm, engineer, Rohm & Haas Company.

The Delaware Valley Section of TAPPI will meet at the Engineer Club, Philadelphia, on Friday, January 14, 1938, at 6:30 P. M. Sheppard T. Powell, consulting engineer, Baltimore, Md., will talk on "Conditioning of Water for Industrial Use" with Particular Reference to the Pulp and Paper Industry.

The Kalamazoo Valley Section of TAPPI will meet at the Park-American Hotel, Kalamazoo, Mich., on Thursday, January 20, 1938 at 6:30 P. M. This meeting will be held jointly with the Michigan Division of the Superintendents Association. R. F. Reed of the Lithographic Technical Foundation, University of Cincinnati, will talk on Lithographic and Printing Papers. Roy Zellers of the French Paper Company will talk on Employer-Employee Relations.

The New England Section of TAPPI will meet at the Holyoke Hotel, Holyoke, Mass., on Friday, January 21, 1938 at 6:30 P. M. James A. Lee, Managing Editor of *Chemical and Metallurgical Engineering* will talk on "Developments in the South."

There will be an informal reunion dinner-dance and entertainment for those who attended the recent fall convention of TAPPI in Savannah. This affair will be held in New York on February 22, 1938 during the annual meeting of TAPPI. The committee would be glad to receive tentative reservations to determine how much interest there will be in such a party. Write to R. G. Macdonald, secretary of TAPPI, 122 E. 42nd street, New York. Members of TAPPI who did not attend the Savannah meeting will be welcome if they will notify the association prior to January 22, 1938. Members are urged to bring their wives to attend the party.

The amendments to Articles IV and V on which TAPPI active members recently voted were approved by the membership.

The following officers were elected for a term of two years in the Inter-Society Color Council, of which TAPPI is a member: Chairman—F. L. Dimmick, American Psychological Association; Vice Chairman—M. Rea Paul, American Society for Testing Materials; Treasurer—Mrs. M. H. Rorke, Textile Color Card Association; Counsellors: R. G. Slauer, Illuminating Engineering Society; I. H. Godlove, Optical Society of America; and John L. Parsons, Technical Association of the Pulp and Paper Industry. Miss Dorothy Nickerson, Color Technologist for the Bureau of Agricultural Economics, Washington, D. C., succeeded R. G. Macdonald of TAPPI, as Secretary.

The TAPPI Delaware Valley Section will hold an informal dinner-dance on Friday, January 28, 1938, at the Bala Country Club, Philadelphia. Alan R. Boyd of F. C. Huyck & Sons is chairman of the entertainment committee. All wishing to attend should notify E. J. Albert, Thwing-Albert Instrument Company, 3339 Lancaster avenue, Philadelphia.

The members of TAPPI have voted to approve the adoption of the following official standards:

Alkaline Pulping Thermal Code ..	O 401	p-35
Soda Pulping Process Terms	O 402	p-36
Zinc Pigments in Paper	T 438	m-36
Titanium Pigments in Paper	T 439	m-36

The three other methods voted on were referred back to the originating committee for further consideration. These were "Water Resistance of Paper, T 433 m-35; Forming Pulp Test Sheets, T 205 m-36; Evaluation of Pulp Cord Wood, T 7 p-36.

Optical Specification of Light-Scattering Materials*

By Deane B. Judd[1]

Abstract

In 1931 Kubelka and Munk worked out the relationship between reflectance and thickness of material for thin, homogeneous layers illuminated diffusely. In the equation expressing this relationship, the hypothetical ideal material is defined by two constants, reflectivity and coefficient of scatter. In the present paper are given data demonstrating how well several types of paper (rag writing, sulphite-writing, book, and newsprint) can be specified by these constants. Summaries of results on vitreous enamel, dental silicate cements and cold-water paints are also given.

Relations between the incident, reflected and emergent light from a thin, homogeneous layer of absorbing and scattering material have been worked out in various forms (*1*) Usually these relations have been developed in theory by considering perfectly diffused light incident on any elementary layer of the material which is assumed to absorb a portion, reflect diffusely another portion, and transmit diffusely the remainder. Traveling of the diffused light through the thin sheet of material has been considered, but scattering of light to the sides, or light lost through the edges of the material, has usually been left out of account because of the added complexity. Of the various derivations the most readily applicable to practical measurement is that of Kubelka and Munk, who carried through the derivation in such a way that the related quantities are those which are customarily measured. The equations of this important derivation have been reproduced and the discussion of them given in English by Steele. (*2*)

Measurements on real materials result in values of reflectance which are related to the thickness of the material in a way somewhat different from that described by the Kubelka-Munk formula; first, because real materials differ from the ideal material assumed in the derivation by being inhomogeneous; second, because the reflectometers fail either to diffuse perfectly the light falling on the sample or to measure all light diffusely reflected, or both; third, because some light is lost through the edges of the samples; and, fourth, because the amounts of light absorbed and scattered by the materials vary according to the wave length of the light. The purpose of the present paper is to discover how large are the departures from theory due to these sources and to inquire whether a description of materials in terms of the simple Kubelka-Munk formulation is sufficiently exact to be of value.

Definition of Terms

$R \equiv$ light reflectance of a specimen, or the fraction of incident light reflected from a specimen. (Except for the ideal, perfectly diffusing specimen, reflectance depends on the angular distribution of incident light.)

$A \equiv$ apparent light reflectance of a specimen, or the reflectance which an ideal, perfectly diffusing specimen would require in order to have the same brightness as the actual specimen under the same illuminating and viewing conditions. (In this work the illuminating and viewing conditions are most frequently chosen so as to avoid taking into account light specularly reflected from glossy specimens; the apparent light reflectance so taken is sometimes called the diffuse reflectance.)

$R_\infty \equiv$ light reflectivity of the material, or the reflectance of an infinitely thick specimen of the material; that is, practically, one so thick that a further increase in thickness does not change its reflectance.

$A_\infty \equiv$ apparent light reflectivity of the material.

$R_0 \equiv$ light reflectance of a specimen in contact with a backing of zero reflectance.

$R_1 \equiv$ light reflectance of a specimen in contact with a backing of unit (100 per cent) reflectance.

$R_{R'} \equiv$ light reflectance of a specimen in contact with a backing of reflectance, R' $(0 \leqq R' \leqq 1)$.

A_0, A_1, and $A_{R'}$, refer to apparent light reflectance and are analogous to R_0, R_1 and $R_{R'}$, respectively.

$C \equiv A_0/A_\infty \cong A_0/A_1$, called ideal contrast ratio.

$C_{R'} \equiv R_0/R_{R'} \cong A_0/A_{R'}$, called simply contrast ratio.

$C_{0.89} \equiv A_0/A_{0.89}$, called TAPPI opacity (3) provided the illumination be in effect perfectly diffused and the direction of view not more than 20 degrees from normal.

$C_\infty \equiv A_0/A_\infty \cong R_0/R_\infty$, called printing opacity if the material is paper.

$X \equiv$ thickness of the specimen (often measured also by weight per unit area).

$S \equiv (dR_0/dX)_{X \to 0}$, called coefficient of scatter, the rate of increase of reflectance of a specimen with thickness for nearly zero thickness of specimen over a black backing.

$SX \equiv$ scattering power of a particular specimen consisting of a thickness, X, of material having coefficient of scatter, S.

Apparatus and Method

General Method

Attention has been chiefly confined in this paper to materials whose reflectance is fairly high and nearly non-selective with respect to wave length. These materials (whites and near-whites) may be expected to have reflectivities and coefficients of scatter nearly independent of the wave length of incident light and there is hope that single average values

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* Presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 22-25, 1937.

[1] National Bureau of Standards, Washington, D. C.

This is a condensed account of the complete paper by this title which in addition to data obtained through the collaboration of Merle B. Shaw on paper also includes data obtained through the collaboration of W. N. Harrison, B. J. Sweo, E. F. Hickson, A. J. Eickhoff, and George C. Paffenbarger on vitreous enamels, cold-water paints, and dental silicate cements. Detailed data on these latter materials are not given in this condensed account. The complete paper has been published in the Journal of Research of the National Bureau of Standards, September, 1937.

of reflectivity and coefficient of scatter may be found to represent them properly even when illuminated by light (such as daylight) of a considerable wave-length range. It is not to be expected that materials having highly chromatic colors can be so represented; such materials will require for their specification values of reflectivity and coefficient of scatter as functions of wave length.

Four classes of materials have been investigated. The general plan of the investigation for each class of materials is:

(1) Select a number (3 to 5) of representative materials ranging in reflectivity from the highest to the lowest usual values.

(2) Prepare from each material a number of specimens ranging in thickness from the thinnest usually encountered in practice up nearly to that of an opaque layer.

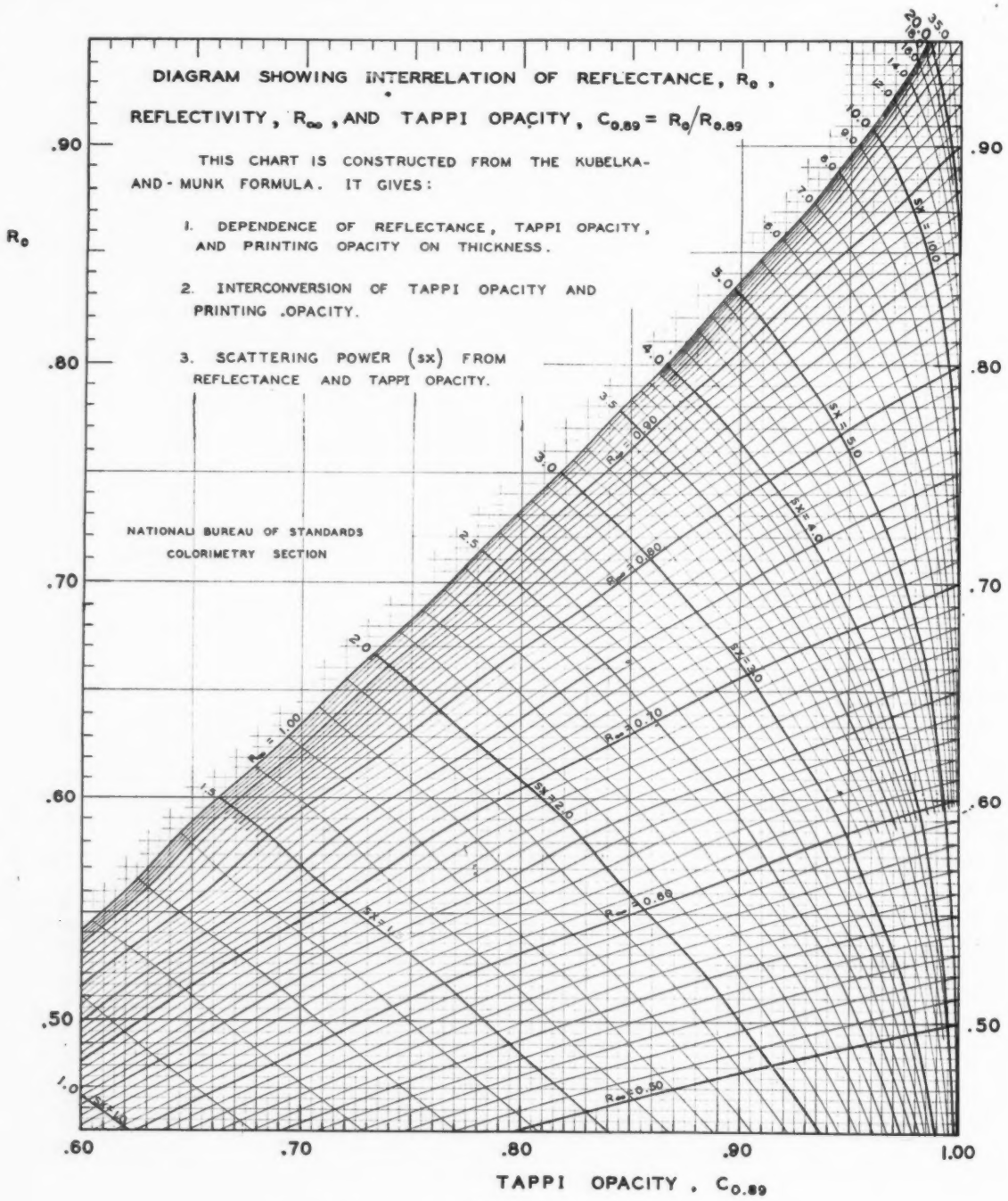


FIG. 1.

Reflectance-Opacity Chart for white backing of reflectance, R' = 0.89.

(3) Measure apparent light reflectance for black backing, A_0, and for white backing, $A_{R'}$, where R′, the reflectance of the backing, is between 0.70 and 0.90.

(4) Check these experimental values, (A_0, $A_{R'}$) against the Kubelka-Munk formula on the assumption that A_0 and $A_{R'}$ are adequate approximations to R_0 and $R_{R'}$ respectively.

GRAPHICAL AIDS

A number of graphical aids for this comparison have been prepared and will now be described.

The Kubelka-Munk formula is

$$R_{R'} = \frac{(R'-R_\infty)/R_\infty - R_\infty(R'-1/R_\infty)e^{SX(1/R_\infty - R_\infty)}}{(R'-R_\infty) - (R'-1/R_\infty)e^{SX(1/R_\infty - R_\infty)}} \quad \ldots\ldots(1)$$

From two measurements of reflectance, $R_{R'}$ of a specimen of known thickness, X, one for each of two backings of different reflectance, R′, it is possible to solve for R_∞ and S from equation (1) and so obtain a specification of the material. This can also be done from two measurements of reflectance made with the same backing but with samples of different thickness, X. The form of equation (1) is so little adapted, however, to easy solution of pairs of simultaneous equations of this sort that all of the solutions required for reducing the experimental data of the present study have been worked out in advance and expressed graphically on reflectance-opacity charts by families of curves for different values of SX and R_∞. The ordinate of such a chart is reflectance, R_0, for black backing, the abscissa is contrast ratio, $C_{R'}$. Figure 1 is a reflectance-opacity chart in which the abscissa is $C_{0.80}$ or TAPPI opacity *(4)*. Two other reflectance-opacity charts have been prepared, one whose abscissa is $C_{0.89}$, and one, $C_{0.70}$. For these charts consult the complete paper.[2] The curves having positive slopes represent the increase in reflectance and opacity of specimens made of increasing thicknesses of the same ideal material. The highest reflectance is obtained, of course, for specimens so thick that they are opaque ($C_{R'} = 1.00$), and this maximum reflectance is the reflectivity, R_∞. The relative thicknesses of the specimens are indicated by the intersections with the curves having negative slopes. Each of the latter curves represents ideal specimens of constant scattering power, SX; each such curve shows the decrease in reflectance, R_0, for black backing and the increase in opacity, $C_{R'}$, of such specimens as their reflectivities are lowered as, for example, by admixture of a non-scattering, light-absorbing material like black dye or black pigment.

These charts[3] provide solutions for the two constants, R_∞ and S, of the ideal material from thickness of sample and given values of measurable reflectances, R_0 and $R_{R'}$. Or, if R_∞ is determined by direct reflectance measurement of a thick layer, the charts yield scattering coefficient, S, from thickness of sample, X, and reflectance, R_0.

The experimental data obtained in this investigation were values of A_0 and $A_{R'}$, the analogue of R_0 and $R_{R'}$. Figure 1 is particularly applicable to measurements of paper because its abscissa is $C_{0.89}$, the particular contrast ratio identified with opacity according to the test methods of the Technical Association of the Pulp and Paper Industry[4]. The $C_{0.80}$ chart refers more particularly to vitreous enamels and paint films because it is more feasible to use as the white backings in such cases coatings having a reflectance of about 0.80. The $C_{0.70}$ chart is used for dental silicate cements because white backings having reflectances of about 0.70 were found to be convenient for this material.

In some cases it was found that the white backing did not exactly equal 0.89, so the chart could not be used directly. In such cases use was made of a formula connecting contrast ratio, $C_{R'}$ with R′, R_0, and ideal contrast ratio, C. *(5)*. This formula is also based on the assumption that the illumination of the specimen is perfectly diffused, but applies to non-homogeneous as well as homogeneous specimens. It is particularly convenient in the reduction of various kinds of data because R′, C, and $C_{R'}$ may each be found explicity, thus:

$$C_{R'} = \frac{C(1-R'R_0)}{C(1-R') + R'(1-R_0)} \quad \ldots\ldots(2a)$$

$$C = \frac{R'C_{R'}(1-R_0)}{1 + R'C_{R'} - C_{R'} - R'R_0} \quad \ldots\ldots(2b)$$

$$R' = \frac{C(1-C_{R'})}{C_{R'}(1-C) + R_0(C-C_{R'})} \quad \ldots\ldots(2c)$$

By substituting equation 2b in equation 2a, an expression for $C_{R'}$ may be found for any desired value of R′, say 0.89, provided R_0 and $C_{R'}$ for any other value of R′ be known. This expression (eq. 3) is written for R′ = 0.89:

$$C_{0.89} = \frac{1 - 0.89\,R_0}{0.11 + \dfrac{0.89(1-R'R_0-C_{R'} + R'C_{R'})}{R'C_{R'}}} \quad \ldots\ldots(3)$$

[1] See *(3)*. The apparent reflectance of white backing mentioned in the standard method is 0.915 relative to that for magnesium oxide. Since the reflectance of magnesium oxide for diffuse illumination is about 0.97, this corresponds to R′ = 0.915 × 0.97 = 0.89.

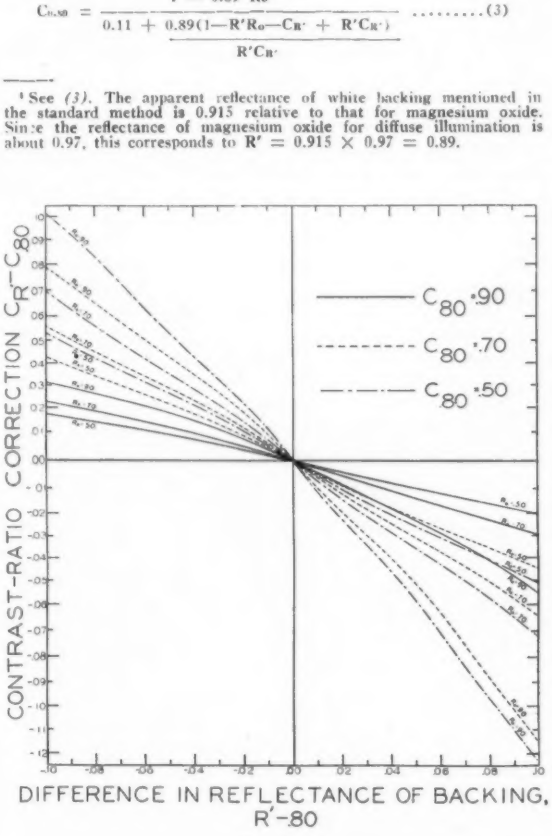


FIG. 2.

Demonstration that the correction to contrast-ratio is nearly proportional to change in reflectance of white backing, R′.

[2] J. Research NBS, 19:287 (1937) R.P. 1026.

[3] A chart serving similar purposes, but having transmission as abscissa instead of opacity, was worked out by Gurevich. See (1).

If R_0 and $C_{R'}$ $(R'/0.89)$ be measured for a given specimen and it be desired to use figure 1 for finding the constants R_∞ and S of the material of this specimen, equation 3 may be used. Fig. 2 is based on a relation analogous to equation 3 and shows how the correction, $C_{R'} - C_{0.80}$, varies with $R' - 0.80$ for different values of $C_{0.80}$ and R_0. Note that the correction in every case is so nearly proportional to $R' - 0.80$ that for deviations of R' from 0.80 equal to 0.01 no significant errors (errors greater than 0.002) will occur if the correction is computed as one-tenth of that for $|R' - .80| = 0.10$. Figure 3 was computed from equation 3 and, by virtue of the near proportionality between correction and deviation of R' from the plotted value (as shown in Fig. 2 for 0.80), figure 3 serves the purposes of equation 3 for most cases arising in practice. The dotted curves (constant R_∞) on this figure were found by reference to Fig. 1, and are often more convenient for obtaining interpolated values than the solid curves (constant R_0).

Conditions of Measurement

The general plan in this investigation has been to use the reflectometers customarily applied to the materials investigated, and to use them in the customary ways. Some of the usual methods, however, are such that no close check on the Kubelka-Munk formula is to be expected, and such methods have been avoided. It is convenient in the discussion of these methods to classify the materials investigated as (1) those in which the scattering elements are distributed in air as the medium (uncoated papers, cold-water-paint films) and (2) those in which the medium is not air (vitreous enamels, dental silicate cements, and oil-paint films).

The pertinence of this classification lies in the assumption by Kubelka and Munk that the hypothetical material is homogeneous. For materials whose scattering elements are distributed in a medium different from air, it is, therefore, not legitimate to allow light reflected from the outer side of the air-medium face to be added to the light reflected from the body of the material. Furthermore, since the theory does not take into account any light reflected back into the body of the material from the inner side of the air-medium face, it could not be expected to describe the facts fully, even if light reflected from the outer side of the air-medium face could be eliminated.

However, if samples of such materials have optically smooth surfaces, light reflected from the outer face can be left out of account by so illuminating and viewing the samples that specularly reflected light does not enter the viewing element of the reflectometer. This has been done in the case of vitreous enamels by using either the Priest-Lange reflectometer *(6)* or the Hunter reflectometer in either its visual *(7)* or photoelectric *(8)* form. The specimens of dental silicate cement do not have optically smooth surfaces, however, and in this case the effect of first-surface reflection was largely avoided by covering the sample with a film of water.

Similar considerations govern determinations of the effective reflectance of the backing, although their neglect may be expected to introduce considerably smaller discrepancies except for specimens of very low opacity. If the sample be in optical contact with a backing which absorbs light sufficiently strongly, the effective reflectance of the backing may, without significant error, be set at zero, but if the optical contact be broken, the film of air so introduced raises the effective reflectance of the backing by as much as 0.12. In the case of vitreous enamels and oil paint films, the ordinary method of preparing specimens insures this optical contact. In our measurement of dental silicate cements, a water film was introduced between sample and backing and produced nearly the same effect. The water film which surrounded the sample served also to protect the cement from changes by contact with air.

For materials whose medium is air (papers, cold-water-paint films), reflection at the surface need not be excluded since this reflection is quite homogeneous with other reflections taking place within the body of the material and is accounted for by the Kubelka-Munk formula. Indeed, for highly calendered papers which exhibit considerable gloss, a better agreement might be expected if provision is made to include specularly reflected light in the measurement. This could be done either by adding a correction to the apparent reflectance measured by the Priest-Lange or the Hunter reflectometer, or by using the Davis photoelectric opacimeter *(9)* which in the manufactured form includes specularly reflected light in the measurement.

None of these instruments either illuminates the sample by perfectly diffused light or measures the total amount reflected at all angles. The materials investigated, however, scatter light sufficiently completely that fair agreement may be hoped for with the Kubelka-Munk formulation, which assumes perfect diffusion.

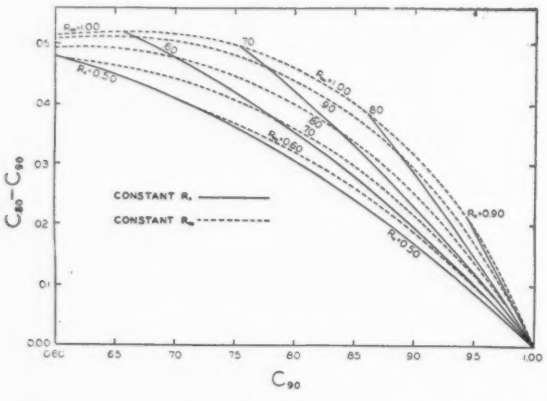


Fig. 3.

The change in contrast-ratio produced by a 10 per cent change in reflectance of white backing. To be used in estimating by proportional parts the corrections to be applied to contrast ratios for paper when the actual white backing has a reflectance different from 89 per cent. This graph extends the application of Fig. 1.

Preparation of Samples

The papers used in this study were made in the experimental paper mill of the bureau by Merle B. Shaw and Martin J. O'Leary. The paper mill contains equipment for the experimental manufacture of practically all types of paper under conditions which in general simulate those of industrial mills. A complete description of the equipment may be found in previous publications. *(10)*

The experimental papers were of three types—writing (two grades), book, and newsprint. Each type was of six different basis weights (designated by the letters A to F in Table I), all made during the same machine run from the same batch of stock,

TABLE I.—DETAILED RESULTS FOR PAPER

Daylight Reflectance, R. Computed from the Brightness Ratio, B_{sample}/B_{MgO}, on the Assumptions: (1) For the Priest-Lange Reflectometer, $R_{MgO} = 0.970$; (2) For the Hunter Reflectometer, $R_{MgO} = 1.000$.

Sample	Ash (Bone Dry Basis) per cent	X Thickness inches	X Weight (25x40 inches, 500 sheets) pounds	R_o P-L(1)	R_o H(2)	R_∞ P-L	R_∞ H	$C_r = R_\infty/R_r$ P-L	$C_r = R_\infty/R_r$ H	$C_{0.89} = R_\infty/R_{0.89}$ P-L	$C_{0.89} = R_\infty/R_{0.89}$ H	TAPPI Opacity B & L	R_r by Chart from R_o and $C_{0.89}$ P-L	R_r by Chart from R_o and $C_{0.89}$ H	SX P-L	SX H	S $X = $ Thickness P-L	S $X = $ Thickness H	S $X = $ Weight P-L	S $X = $ Weight H
RW-A	0.36	0.0028	38	0.691	0.683	0.882	0.890	0.783	0.767	0.782	0.767	0.769	0.875	0.890	2.35	2.23	840	800	0.062	0.059
B	.35	.0033	46	.726	.717	.887	.891	.819	.805	.818	.806	.802	.882	.889	2.65	2.66	850	810	.061	.058
C	.32	.0040	53	.754	.752	.887	.891	.850	.844	.852	.844	.847	.880	.891	3.33	3.23	850	810	.061	.058
D	.36	.0045	64	.782	.777	.885	.891	.884	.872	.880	.872	.872	.887	.891	3.53	3.58	880	840	.063	.061
E	.37	.0053	75	.805	.801	.887	.891	.884	.899	.909	.900	.901	.882	.890	3.75	3.78	900	850	.062	.059
F	.38	.0082	111	.849	.842	.889	.890	.889	.946	.954	.946	.950	.888	.890	4.27	4.52	980	850	.064	.060
Av.	0.36			.885	.888	0.886	0.891						0.882	0.890	7.2	6.6	880	810	.065	.059
G																	865	817	0.063	0.059
SW-A	0.38	0.0027	38	0.614	0.606	0.820	0.811	0.749	0.747	0.719	0.715	0.712	0.811	0.800	1.72	1.67	640	620	0.045	0.044
B	.38	.0031	46	.656	.646	.818	.809	.802	.799	.772	.768	.768	.814	.801	2.11	2.04	680	660	.046	.044
C	.34	.0037	52	.688	.677	.821	.815	.838	.831	.813	.807	.807	.817	.805	2.50	2.40	680	650	.048	.046
D	.37	.0046	64	.724	.717	.821	.814	.882	.881	.858	.860	.862	.820	.808	3.11	3.06	680	670	.049	.048
E	.35	.0052	76	.746	.740	.822	.817	.833	.906	.888	.888	.887	.820	.813	3.63	3.57	700	690	.048	.047
F	.34	.0081	118	.789	.778	.820	.811	.829	.959	.950	.949	.944	.821	.810	5.50	5.3	680	650	.047	0.45
Av.	0.36			.880	.888	0.820	0.813						0.817	0.806			677	657	0.047	0.046
G																				
B-A	5.80	0.0030	39.1	0.730	0.725	0.831	0.827	0.844	0.845	0.878	0.877	0.862	0.858	0.85	0.825	0.822	3.19	3.12	1060	1040	0.080	0.082
B	5.81	.0035	46.0	.750	.745	.832	.828	.847	.843	.902	.900	.883	.884	.88	.831	.822	3.61	3.58	1030	1020	.078	.078
C	5.76	.0041	53.9	.772	.769	.829	.828	.837	.839	.931	.929	.920	.917	.91	.825	.825	4.48	4.36	1090	1060	.083	.081
D	5.82	.0048	62.5	.785	.785	.831	.829	.839	.838	.945	.947	.933	.937	.93	.830	.827	4.95	5.05	1030	1050	.078	.081
E	5.93	.0059	76.0	.804	.802	.833	.833	.836	.969	.966	.964	.959	.95	.828	.829	6.45	1090	1050	.085	.082
F	6.22	.0103	129.5	.825	.821	.829	.826	.828	.995	.994	.995	.992	.99	.828	.827	11.3	1100	990	.087	.079
Av.	5.89			.880	.888	0.830	0.828						0.830	0.825			1063	1043	0.082	0.080
G																				
N-A	0.39	0.0040	37	0.603	0.593	0.623	0.611	0.638	0.626	0.968	0.971	0.945	0.947	0.93	0.621	0.609	3.10	3.53	780	760	0.084	0.082
B	.38	.0046	43	.607	.598	.621	.608	.629	.617	.978	.984	.965	.969	.95	.618	.608	3.52	3.56	770	770	.082	.083
C	.38	.0056	53	.616	.605	.624	.610	.627	.614	.987	.992	.982	.985	.98	.621	.609	4.23	4.28	760	760	.080	.081
D	.39	.0064	64	.624	.610	.624	.612	.625	.613	1.000	.997	.998	.995	.99	.625	.612	6.5	5.6	900?	900?	.11	.093
E	.39	.0075	75		.604		.605		.606		.998		.997	.99		.605		6.7	∞?	∞?		.092
F	.39	.0132	122		.598		.598		.598		1.000		1.000	1.00		.598		∞	∞?	∞?		∞?
Av.	0.39				.888	0.623	0.607						0.621			0.607			770	747	0.082	0.080
G																				

thereby precluding any differences in effects of beating, jordanning or other processing in the preparation of the stock. Rosin size but no coloring matter was used in the papers. The following describes the papers made.

Writing papers—Writing paper was made from sulphite pulp (designated SW in Table I) and from rag halfstuff that had been bleached to a very good white color (designated RW in Table I). One and one-half per cent of rosin size was added in each. No filler or dye was used.

Book paper—The book paper (designated B in Table I) contained clay because the beater furnish was paper-machine "broke" (trimmings or torn paper) from previous runs of book papers in which clay had been used. One and one-half to two per cent of rosin size, based on weight of dry fiber, was added. Data on weight, thickness, and ash for each basis weight of the paper made are given in Table I.

Newsprint paper—The beater furnish for this run (designated N in Table I) was newsprint taken from a roll of commercial newsprint paper. For this run only one-half per cent of size was used.

It was found impossible to obtain the same finish on the heavy papers, designated E and F in the table, as was obtained on the lighter-weight papers because of the smallness of the calender stack. The heavier papers, especially sample F, seemed "two-sided." The smoother side was the under- or wire-side; the other side was marked by the couch-roll jacket.

Measurements

Measurements of reflectance were made on the Hunter "photox photoelectric" reflectometer" and on the Priest-Lange reflectometer. Five samples of each paper were tested, the Hunter reflectometer giving average apparent reflectance over a nearly circular area about 7 cm in diameter, the Priest-Lange reflectometer over a semi-curcular area of about 1 cm diameter near the center of the sample. The backings used for these measurements were (1) black velvet for which R′ was taken equal to zero, (2) an opaque stack of the paper itself for which R′ was taken equal to R_∞, and (3) a backing designated as G which consisted of an opaque stack of rag writing paper (RW-F) for which R′ varied from 0.888 to 0.880 because of slight soiling during use. The results of these measurements by the two reflectometers are given in Table I in parallel columns, the Priest-Lange reflectometer being designated by the letters P-L, and the Hunter reflectometer being designated by the letter H.

Both of these reflectometers measure apparent reflectance, A, relative to magnesium oxide, the Priest-Lange reflectometer illuminating the sample and standard nearly diffusely and viewing them perpendicularly, the Hunter reflectometer illuminating them nearly perpendicularly and viewing them at nearly 45°. The estimated values of reflec-

ance, R, given in Table I for the nearly mat paper samples were found from the Priest-Lange values as 0.97 A/AMgO, and from the Hunter values as simply A/AMgO. These estimates are based on the values of AMgO for the respective angular conditions; that is, for the conditions of the Hunter reflectometer AMgO = 1.00. *(11)* The estimates are also based on the assumption, known not to be strictly justified, that the paper samples are perfect diffusers, that is, that the light reflected from them is distributed equally in all directions.

Both the Priest-Lange reflectometer readings and those by the Hunter reflectometer are characteristic of observation of the samples in daylight by a normal human observer. With the Priest-Lange reflectometer, a visual instrument, this effect was obtained by using a sunlight filter; with the Hunter reflectometer, although the illuminant was a gas-filled lamp, approximately this effect is obtained because the spectral sensitivity of the photox cell is relatively somewhat higher for the short-wave part of the spectrum than the spectral luminosity curve for the average eye.

There are also shown in Table I values of TAPPI opacity for these papers obtained from a photoelectric opacimeter designed by M. N. Davis. *(9)* In this opacimeter the sample is illuminated nearly perpendicularly by incandescent-lamp light and is viewed diffusely by means of an integrating cube and photronic cell.

Reduction of Data

Entries in the column headed, $C_\infty = R_0/R_\infty$ of Table I were obtained by simple division of values of R_0 by R_∞. This ratio for paper has been used considerably under the name of printing opacity.

Entries in the column headed $C_{0.89} = R_0/R_{0.89}$ were computed from R_0 and R_G. This computation would have been simple division provided sample G had turned out to have a reflectance of exactly 0.89. Since, however, in some cases the reflectance of sample G departed by as much as 0.01 from 0.89, corrections read from Fig. 3 were applied. As an example of the way to apply these corrections take sulphite writing paper of the least thickness (SW-A). The reflectance over a black backing, R_0, is estimated from the results by the Priest-Lange reflectometer as 0.614 (see Table I); that over backing G, as 0.848. The ratio, R_0/R_G, is 0.724, and since backing G had a reflectance during this reading of 0.880, this result could be written: $C_{0.88} = 0.724$. To nd $C_{0.89}$ for this sample refer to Fig. 3. For $C_{0.90}$ in the neighborhood of 0.72 and for R_0 about 0.61, the value of the correction, $C_{0.89} - C_{0.90}$, for a deviation of R′ of 0.10 is seen to be about 0.047. Since this case yields a deviation in R′ of only 0.01, the correction is taken as one-tenth the value read from Fig. 3, that is, the correction to be applied is 0.005. The value of $C_{0.89}$ is, therefore, 0.724 — 0.005 = 0.719.

Values of R_∞ and SX were read from R_0 and $C_{0.89}$ by means of Fig. 1. From the values of SX, S was computed both for X taken as basis weight in pounds per 500 sheets of 25 x 40 inches and X taken as thickness in inches.

Discussion

It may be noted that for the writing paper and the newsprint paper estimates of reflectance from readings of the Priest-Lange reflectometer tend to be higher by about one per cent than those from readings of the Hunter reflectometer. For the book paper the difference is in the same sense but considerably less. The data from the two instruments have been reduced separately so that the amount of the differences may be traced through to the end. These differences are evidently related to angular distribution of the reflected light; and, in fact, for some other materials the differences are in the opposite direction.

Values of $C_{0.89}$ since they refer to daylight as illuminant are not quite comparable with those of TAPPI opacity obtained by the Davis (B. & L.) opacimeter which refer to incandescent-lamp light. The yellower light from the incandescent lamp is expected to penetrate paper more readily because both absorption and scattering coefficients of these papers are lower for long-wave light, and this greater penetration results in values of TAPPI opacity somewhat lower than those of $C_{0.89}$ obtained from the Priest-Lange reflectometer. The angular conditions of illuminating and viewing for these two instruments are nearly reciprocal; hence, they would be expected to yield comparable results were it not for the difference in spectral energy distribution of illuminant. The Hunter reflectometer on the other hand uses both unidirectional illumination and unidirectional viewing; so it would not be expected to yield results exactly comparable to the other two instruments which use either diffuse illumination or diffuse viewing. It is of interest, however, to note that $C_{0.89}$ by the Hunter reflectometer is in good agreement with TAPPI opacity. This suggests that for these papers the disparity in spectral distribution of illuminant and receptor sensitivity has by a coincidence been closely compensated for by the difference in angular distribution.

The agreement between the observed reflectivities, R_∞, and those obtained from the chart is good, the differences in all but two or three cases being less than the uncertainty of the experimental results. There is a significant tendency, however, exhibited in most of the results, for reflectivity estimated by the chart (Fig. 1) based on the Kubelka-Munk theory to be lower than that directly measured, the thinner papers showing the greater discrepancy. It is concluded, therefore, that the Kubelka-Munk theory does not apply strictly to papers measured in the usual way with these reflectometers. The cause for the slight discrepancies is not definitely known.

The coefficients of scatter show a similar tendency to be slightly lower for the lower thicknesses of paper although this tendency is of doubtful significance for the book papers. A possible explanation of the tendency of both reflectivity and coefficient of scatter to be low for thin samples of the non-weighted papers is that the water in draining out of the thin samples carried away disproportionately large numbers of fine white particles compared to thicker samples.

The degree of agreement between the measurements and the Kubelka-Munk theory is also shown in Figs. 4, 5, and 6. The plotted points represent the results of measurement; the solid curves represent the Kubelka-Munk theory (eq. 1) for constants adjusted to fit nearly as closely as possible the measurements made by means of the Priest-Lange reflectometer; the dotted curves similarly represent the theory fitted to the measurements made by the Hunter reflectometer. These graphs show the measured rise in reflectance over black backing, R_0, and the measured rise in opacity compared to the respective

theoretical variations. The small but significant deviations from the theory are evident as is also the rather closer fit to theory obtained with the rag writing and book papers. Results for the newsprint papers are omitted because of the restricted range in opacity obtained.

It is concluded that, except for deviations of less than one per cent, the Kubelka-Munk theory applies to paper; the two constants of the theory, reflectivity, R_∞, and coefficient of scatter, S, yield a useful description of the material of which paper is made. This holds both for X as thickness and for X as basis weight. By means of a description in these terms the optical properties of the papers made from the four types of furnishes studied may be predicted within one per cent over the whole practical range of basis weights. The constants may also be correlated with the appearance and composition of the paper.

Table II gives a summary of the average characteristics determined from the Hunter reflectometer for the four types of paper studied. Average values of ash are also included.

TABLE II.—SUMMARY FOR PAPER

Type of Paper	Reflectivity R_∞	Coefficient of Scatter, S		Ash
		Per In.	Per Lb.	
Rag writing	0.89	820	0.059	0.36
Sulphite writing	.81	660	.046	0.36
Book	.83	1,040	.080	5.89
News print	.61	750	.080	0.39

Reflectivity is seen to be highest for the rag writing paper and lowest for the newsprint paper; it correlates with usefulness of the paper to form a background for legible dark letters and it also correlates with the cost of the paper. *(12), (13)* Coefficient of scatter expressed per unit basis weight is lowest for the sulphite writing paper and highest for the book and the newsprint. The increased coefficient of scatter for the book paper over the rag writing paper may be ascribed to the presence of clay filler (note high ash); that for newsprint paper may be ascribed to the presence of groundwood. Coefficient of scatter expressed per unit thickness is also lowest for the sulphite writing paper but that for the newsprint paper is in this case considerably lower than that for the book paper. This corresponds to the greater bulk of the newsprint paper.

This general applicability of the Kubelka-Munk theory to paper is in agreement with the less detailed reports by Steele *(2)* and Lewis *(13)*.

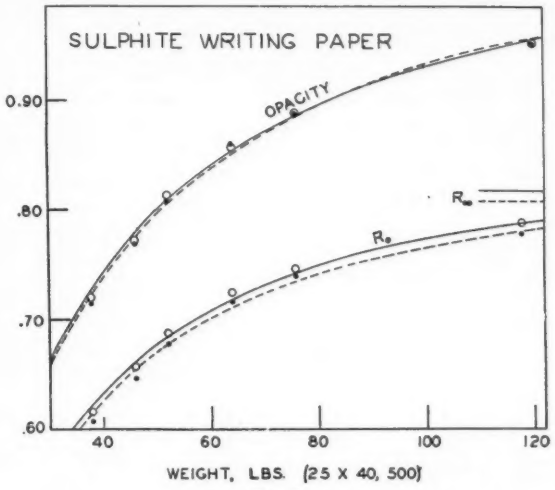


FIG. 5.

The rise in opacity, $C_{0.89}$, (upper curve) and reflectance, R_o, (lower curve) of sulphite writing paper with basis weight. The plotted points are estimates of R_o based on measured values of apparent reflectance A_∞; the curves are from the Kubelka-Munk theory.

Summary

It is concluded that the simple Kubelka-Munk theory applies to reflectance measurements of vitreous enamel, cold-water paint, paper and dental silicate cements, made on the usual reflectometers in the usual ways. Either no regular deviations of theory from actual measurement are found, or the deviations found are of about the order of magnitude of the experimental uncertainty. It has been found that the agreement between theory and experiment is equally as good for materials whose medium differs from air (vitreous enamel and dental silicate cement) as it is for materials whose medium is air (paper and cold-water paint). It would seem, therefore, that corrections for light reflected from the inner side of the air-medium face are negligible. Description of these materials by means of the two constants of the theory, reflectivity and coefficient of scatter, is, therefore,

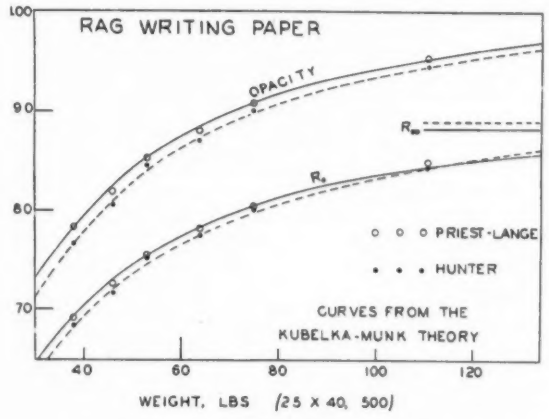


FIG. 4.

The rise in opacity, $C_{0.89}$, (upper curve) and reflectance, R_o, (lower curve) of rag writing paper with basis weight. The plotted points are estimated of R_o based on measured values of apparent reflectance A_∞; the curves are from the Kubelka-Munk theory.

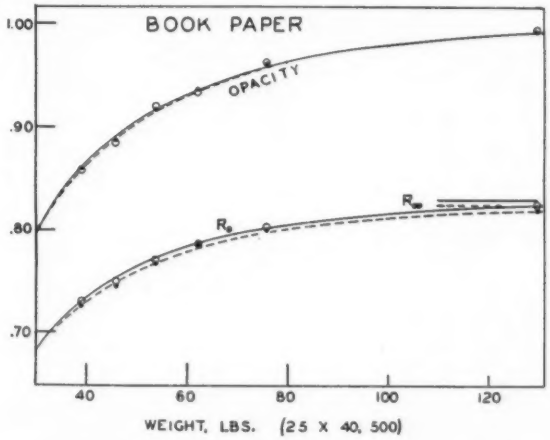


FIG. 6.

The rise in opacity, $C_{0.89}$, (upper curve) and reflectance, R_o, (lower curve) of book paper with basis weight. The plotted points are estimates of R_o based on measured values of the apparent reflectance A_∞; the curves are from the Kubelka-Munk theory.

of practical validity and use. The most valuable use of the methods described herein is to differentiate in a fundamental way between various members of the same group of materials. Such differentiations are illustrated in Table II. These methods also permit comparisons to be made between different classes of materials. Such comparisons are shown in Table III in

TABLE III.—SUMMARY

Material	Reflectivity R_∞	Coefficient of Scatter, S (Thickness in Microns
Vitreous Enamel:		
1	0.89	0.0100
2	.90	.0090
3	.89	.0064
4	.82	.0056
Cold-Water Paint:		
a	0.92	0.084
b	.90	.075
c	.88	.090
d	.93	.079
e	.90	.075
f	.86	.072
g	.91	.073
h	.93	.065
i	.91	.059
Paper:		
Rag Writing	0.89	0.032
Sulphite Writing	.81	.026
Book	.83	.041
News Print	.61	.030
Dental Silicate Cement:		
F (White)	0.76	0.0006
D (Light Yellow)	.50	.0004
D (Light Yellowish Gray)	.40	.0004
K (White)	.59	.0002
K (Dark Gray)	.16	.0002

which the coefficient of scatter refers to thickness expressed in microns. It will be noted that materials whose scattering elements are distributed in air (cold-water paint, paper) have higher coefficients of scatter. Note also that vitreous enamels have a much higher coefficient of scatter than dental silicate cements; this corresponds to the different purposes of the two materials, the one to hide the ground coat with as thin a layer as possible, the other to match fairly translucent tooth enamel.

The methods and graphical aids presented herein serve not only for the derivation of the fundamental constants of a light-scattering material according to the Kubelka-Munk theory but also for the reverse derivation, that of the reflectance and opacity of any thickness of the material of known constants. They also indicate the effect on reflectance and opacity produced by adding non-scattering dye or pigment. By means of these methods and graphical aids it has been found convenient to apply the Kubelka-Munk theory, and this theory has been useful in research as well as in the specification of light-scattering materials.

Literature Cited

(1) Stokes, G. G. On the Intensity of Light Reflected from or Transmitted Through a Pile of Plates, *Proc. Roy. Soc., London*, 11, 545 (1860-62).
Channon, H. J., Renwick, F. F., and Storr, B. V., The Behavior of Scattering Media in Fully Diffused Light, *Proc. Roy. Soc.*, London, (A), 94, 222 (1918).
Silberstein, L., The Transparency of Turbid Media, *Phil. Mag.* (7), 4, 1291 (1927).
Gurevich, M., Ueber eine Rationelle Klassification der Lichtstreuenden Medien, *Physik. Zsf.*, 31, 753 (1930).
Ryde, J. W. and Cooper, B. S., The Scattering of Light by Turbid Media, *Proc. Roy. Soc.*, London, (A), 131, 451 (1931).
Kubelka, P., and Munk, F., Ein Beitrag zur Optik der Farbanstriche, *Zsf. f. Tech. Phys.*, 12, 593 (1931).
Smith, T., The Hiding Power of Diffusing Media, *Trans. Opt. Soc.*, 33, 150 (1931-32).

(2) Steele, F. A., The Optical Characteristics of Paper. I. The Mathematical Relationships Between Basis Weight, Reflectance, Contrast Ratio and Other Optical Properties, *Paper Trade J.*, 100, No. 12, 37 (March 21, 1935).

(3) TAPPI Standard T425M-36, Opacity of Paper. Technical Association of the Pulp and Paper Industry, New York, N. Y. (1936).

(4) Judd, D. B., The Dependence of Reflectance and Opacity on Thickness; Relation Between Contrast Ratio and Printing Opacity, *Paper Trade J.*, 101, No. 5; T.S.40 (Aug. 1, 1935).

(5) Judd, D. B., Opacity Standards, *J. Research NBS*, 13:281 (1934); *Paper Trade J.* 100, *No.* 1; T.S. 28 (Jan. 3, 1935).

(6) Priest, I. G., The Priest-Lange Reflectometer Applied to Nearly White Porcelain Enamels, *J. Research NBS*. 15, 529 (1935); R. P. 847.

(7) Hunter, R. S., A Reflectometer and Color Comparator, *Sci. Sec. Cir. No. 461*, National Paint, Varnish and Lacquer Assoc., Washington, D. C. (April, 1934).

(8) Hunter, R. S., A Null Method Photo-electric Reflectomer, *J. Opt. Soc. Am.* 26:225 (1936); *Bull. Am. Ceramic Soc.* 15:79 (1936); *Better Enameling* 7:12 (March, 1936).

(9) Davis, M. N., A Simple and Reliable Photoelectric Opacity Tester, *Tech. Assoc. Papers*, 16:277 (1933).

(10) Caroá Fiber as a Papermaking Material, *Tech. Paper. U. S. Bur. Stds.*, 21:338-341 (1927), T 340.
Further Experimental Production of Currency Paper in The Bureau of Standards Paper Mill, *Bur. Stds. J. Res.* 3:904-5 (1929); R.P. 121.
Equipment and Research Work in the Bureau of Standards Paper Mill, *Paper Trade J.* 89, No. 19:60-63 (1929).

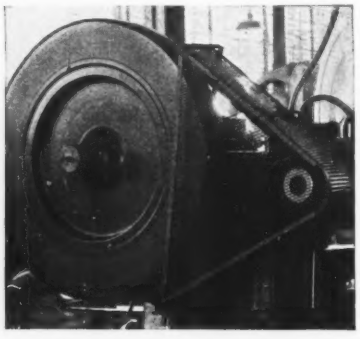
(11) Preston, J. S. The Reflection of Magnesium Oxide. *Trans. Opt. Soc.*, 31:15 (1929-30).
McNicholas, H. J., Absolute Methods in Reflectometry, *Bur. Stds. J. Res.* 1:29 (1928); R.P. 3.
Preparation and Colorimetric Properties of a Magnesium Oxide Reflectance Standard, Bur. Stds. Letter Cir., L.C. 395.

(12) A better index of cost than daylight reflectivity is reflectivity for blue light (often called "brightness"), see Lewis, L. C. Definition of Brightness, *Paper Trade J.*, 101, No. 6, T. S. 64 (Aug. 8, 1935).

(13) Lewis, L. C., Recent Progress on Color Problems in the Paper Industry, *Paper Trade J.*, 103, No. 22, T. S. 323 (November 26, 1936).

Rockwood Fibre Laggings

A new fiber lagging, made by the Rockwood Manufacturing Company, 1801-2001 English Avenue, Indianapolis, Ind., with improved clamp is used to increase the diameter of pulleys and fly wheels. Increasing the diameter of the driven pulley permits increasing the size of the motor pulley and results in higher belt speed. Then it is not necessary to operate the belt so tight, which increases the belt life and reduces belt maintenance.



The increased belt speed also increases the capacity of the driven machine. Compared with cast iron the fibre surface will transmit at least 50 percent more power and often increases output of driven machines 10 per cent or more. As the belt tension is reduced, due to the higher belt speed, the danger of burning out a motor bearing is also reduced.

Very often fly wheels are too small and to get the speed needed a motor pulley smaller than the motor manufacturer recommends must be used. When this is done—and it is done all too frequently—bearing trouble occurs and the belt life is reduced. With the larger motor pulley the belt tension may be reduced.

Rockwood Fiber Laggings are made of the same material as Rockwood Paper Pulleys — which are standard on motors the world over. The compressed end grain fiber belt surface makes an ideal pulling surface that grips and pulls the belt without slip. The laggings are supplied in any width and up to 72 inches in diameter. They are applied by clamping on the wheel rim with a perfected clamp of great simplicity.

The laggings are also used in place of pulley coverings where operators need more transmitting capacity, provided the three to four inch increased diameter of pulley is not objectionable. Riveted or cemented coverings often require replacement or they may lose their initial belt grip. Rockwood Laggings do not require replacement and they retain their high belt gripping capacity indefinitely. They are easy to apply, inexpensive, and very often will save the cost of a new fly wheel.

Imports of Paper and Paper Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports, of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

NEW YORK IMPORTS

WEEK ENDING JANUARY 1, 1938

SUMMARY

Cigarette paper .....3 cs.
Wall paper ..... 6 rolls, 1 ctn.
Wall board .....3,810 bdls.
Paper hangings .....16 bls., 5 cs.
Newsprint .....12,031 rolls
Printing paper .....38 rolls, 26 cs.
Filter paper .....13 cs.
Bristol boards .....1 cs.
Metal covered paper .....22 cs.
Coated paper .....1 cs.
Photo paper .....2 cs.
Decalcomanias .....11 cs.
Writing paper ..... 2 cs.
Tissue paper .....2 cs.
Paper tubes .....242 cs.
Miscellaneous Paper .....10 bbls., 3 cs.

CIGARETTE PAPER

De Mauduit Paper Corp., *Normandie,* Havre, 3 cs.

WALL PAPER

Titan Shipping Co., *New York,* Hamburg, 1 ctn.
Globe Shipping Co., *New York,* Hamburg, 6 rolls.

WALL BOARD

Treetex Corp., *Argosy,* Horneborg, 3,810 bdls.

PAPER HANGINGS

W. H. S. Lloyd & Co., *American Trader,* London, 16 bls., 5 cs.

NEWSPRINT

Neidich Process Co., *Scanmail,* Helsingfors, 36 rolls.
Lunham & Reeve, Inc., *Scanmail,* Kotka, 479 rolls.
Walker Goulard Plehn Co. Inc., *Scanmail,* Kotka, 143 bls..
———, *Topdalsfjord,* Skien, 317 rolls.
———, *Topdalsfjord,* Oslo, 525 rolls.
International Paper Co., *Humberarm,* Dalhousie, 8,860 rolls.
International Paper Sales Co., *Humberarm,* Dalhousie, 538 rolls.
Perkins Goodwin & Co., *New York,* Hamburg, 266 rolls.
Perkins Goodwin & Co., *Hamburg,* Hamburg, 498 rolls.
Jay Madden Corp., *Scanpenn,* Kotka, 369 rolls.

PRINTING PAPER

Senefelder Co., *New York,* Hamburg, 8 cs.
S. H. Pomerance, *American Trader,* London, 7 cs.
Dingelstedt & Co., *Hamburg,* Hamburg, 38 rolls, 11 cs.

FILTER PAPER

C. Schleicher & Schull Co. Inc., *New York,* Hamburg, 13 cs.

BRISTOL BOARDS

Keuffel & Esser Co., *American Trader,* London, 1 cs.

METAL COVERED PAPER

K. Pauli Co., *New York,* Hamburg, 6 cs.
K. Pauli Co., *Hamburg,* Hamburg, 16 cs.

COATED PAPER

W. J. Byrnes, *Berengaria,* Southampton, 1 cs.

PHOTO PAPER

Medo Photo-Supply Co., *Samaria,* Liverpool, 2 cs.

DECALCOMANIAS

Sellers Transportation Co., *Hamburg,* Hamburg, 11 cs.

WRITING PAPER

H. W. Robinson & Co., *New York,* Hamburg, 2 cs.

TISSUE PAPER

Lansen Naeve Co., *New York,* Hamburg, 2 cs.

PAPER TUBES

———, *New York,* Hamburg, 190 cs.
———, *Hamburg,* Hamburg, 52 cs.

MISCELLANEOUS PAPER

Jay Madden Corp., *Scanmail,* Helsingfors, 10 bbls.
Chase National Bank, *New York,* Hamburg, 2 cs.
Keuffel & Esser Co., *Hamburg,* Hamburg, 1 cs.

RAGS, BAGGING, ETC.

Darmstadt Scott & Courtney, *Scanmail,* Copenhagen, 65 bls. bagging.
Irving Trust Co., *Quaker City,* Liverpool, 275 bags picker waste.
D. M. Hicks, Inc., *Quaker City,* Manchester, 37 bls. old twine.
———, *Belvedere,* Trieste, 95 bls. bagging, 70 bls. rags, 102 bls. old cottons.
———, *Exhibitor,* Istanbul, 88 bls. rags.
Irving Trust Co., *Skagerak,* Bombay, 143 bls. rags.
———, *American Trader,* London, 150 bls. rags.
Darmstadt, Scott & Courtney, *Scanpenn,* Copenhagen, 37 bls. bagging, 48 bls. old strings.
———, *Trongate,* Lisbon, 64 bls. bagging.
Bank of N. Y. Trust Co., *Hamburg,* Hamburg, 105 bls. rags.

HIDE CUTTINGS

Transatlantic Animal By Products Corp., *Potter,* Calcutta, 277 bls.

OLD ROPE

———, *Quaker City,* Liverpool, 77 coils.

WOOD PULP

Lagerloef Trading Co., *Scanmail,* Wiborg, 2113 bls. sulphate, 422 tons.
Lagerloef Trading Co., *Scanmail,* Wiborg, 130 bls. sulphite, 26 tons.
Lagerloaf Trading Co., *Scanmail,* Kotka, 696 bls. sulphite, 130 tons.
J. Andersen, & Co., *Topdalsfjord,* Oslo, 2,500 bls. sulphite.
Irving Trust Co., *Topdalsfjord,* Oslo, 250 bls. chemical pulp.
The Borregaard Co., Inc., *Topdalsfjord,* Sarpsborg, 1,176 bls. wood pulp.
Castle & Overton, Inc., *New York,* Hamburg, 625 bls. wood pulp, 125 tons.
Bank of N. Y. Trust Co., *Argosy,* Hernosand, 900 bls. sulphite, 150 tons.
E. M. Sergeant Pulp & Chemical Co., *Argosy,* Hernosand, 450 bls. sulphite, 75 tons.
E. M. Sergeant Pulp & Chemical Co., *Argosy,* Hernosand, 450 bls. sulphate, 75 tons.
Price & Pierce, Ltd., *Argosy,* Hernosand, 1,800 bls. sulphite, 300 tons.
Price & Pierce, Ltd., *Argosy,* Hernosand, 150 bls. sulphate, 25 tons.
National City Bank, *Argosy,* Hernosand, 300 bls. sulphite, 50 tons.
Gottesman & Co. Inc., *Argosy,* Hernosand, 6.000 bls. kraft sulphate 1,000 tons.
———, *Argosy,* Hernosand, 300 bls. sulphite, 50 tons.
———, *Argosy,* Iggesund, 2,250 bls. sulphate, 450 tons.
———, *Argosy,* Iggesund, 3,041 bls. sulphite, 601 tons.
Pagel Horton & Co. Inc., *Argosy,* Gefle, 1,625 bls. sulphite, 325 tons.
Bulkley Dunton Pulp Co. Inc., *Argosy,* ———, 1,500 bls. sulphite, 304 tons.
Lagerloef Trading Co., *Scanpenn,* Helsingfors, 260 bls. mechanically ground, 52 tons.
Lagerloef Trading Co., *Scanpenn,* Helsingfors, 1,985 bls. sulphite, 345 tons.
Johaneson Wales & Sparre, Inc., *Hamburg,* Hamburg, 508

bls. chemical pulp, 101 tons.

WOOD PULP BOARDS

Jay Madden Corp., *Scanmail,* Wiborg, 40 bls., 5 tons.
Jay Madden Corp., *Scanpenn,* Wiborg, 32 bls., 3 tons.
W. Bersch, *New York,* Hamburg, 160 bls., 21 tons.
Flexideal Dry Mat Co., *Hamburg,* Hamburg, 70 bls. (sheets), 10 tons.

PORTLAND IMPORTS

WEEK ENDING JANUARY 1, 1938

Pagel Horton & Co. Inc., *Pluto,* Sweden, 4,065 bls. wood pulp.

BOSTON IMPORTS

WEEK ENDING JANUARY 1, 1938

Price & Pierce, Ltd., *Lagaholm,* ——, 2,100 bls. bleached sulphite.

PHILADELPHIA IMPORTS

WEEK ENDING JANUARY 1, 1938

J. M. Hagy Waste Works, *Black Condor,* Antwerp, 47 bls. bagging.
Lagerloef Trading Co., *Scanpenn,* Wiborg, 415 bls. sulphite, 83 tons.
Jay Madden Corp., *Scanpenn,* Wiborg, 5 bls. wood pulp boards.
Jay Madden Corp., *Scanpenn,* Kotka, 167 bls. wood pulp boards, 25 tons.
A. Hurst & Co., West Calumb, Buenos Ayres, 150 bags casein, 15,000 kilos.

WILMINGTON IMPORTS

WEEK ENDING JANUARY 1, 1938

Lagerloef Trading Co., *Scanpenn,* Wiborg, 4,965 bls. sulphite, 993 tons.
Castle & Overton, Inc., *Scanpenn,* Wiborg, 5,156 bls. wood pulp, 1,031 tons.
Castle & Overton, Inc., *Scanpenn,* Kotka, 780 bls. wood pulp, 156 tons.
Lagerloef Trading Co., *Scanpenn,* Kotka, 1,560 bls. mechanically ground wood pulp, 312 tons.

BALTIMORE IMPORTS

WEEK ENDING JANUARY 1, 1938

Price & Pierce, Ltd., *Gonzenheim,* ——, 3,900 bls. unbleached sulphite.
Pagel Horton & Co. Inc., *Tennessee,* Sweden, 4,512 bls. wood pulp.

NORFOLK IMPORTS

WEEK ENDING JANUARY 1, 1938

Reliance Bagging Co., *Quaker City,* Manchester, 233 bls. bagging.
Gottesman & Co. Inc., *Teneriffa,* Sweden, 6,000 bls. sulphite.

NEWPORT NEWS IMPORTS

WEEK ENDING JANUARY 1, 1938

Gottesman & Co. Inc., *Delhi,* Sweden, 1,200 bls. sulphite.

Britain Imports More Kraft

British imports of kraft and other packing and wrapping papers increased steadily both in quantity and in value during the years 1934, 1935 and 1936. Total imports of packing and wrapping papers during the last year mentioned amounted to 276,079 long tons, of which kraft accounted for 121,521 tons. Swedish manufacturers have dominated the British market for packing and wrapping papers for many years, and the gain in kraft imports have chiefly benefited that country.

The volume of imports of kraft into the United Kingdom during the first 9 months of 1937 declined by approximately 13 percent, with Sweden sending 18 percent less. The decline in total value, however, was exceedingly slight, amounting to only about 1 percent.

Brown Potentiometer Pyrometer

Brown instrument engineers have incorporated many new features in the Brown Multi-Color Numeral Printing Potentiometer Pyrometers which can be briefly summed up as simplicity of design, ruggedness and durability.

With this desirable method of recording several temperatures on one chart where temperature changes overlap, no special skill is required to decipher the easily-read multi-color numerals on the Brown Multiple Recording Potentiometer Pyrometer chart.

Only one symbol, the plus (+) sign, is used and the numeral identifies the thermocouple from which the temperature record is being made. The + sign (an exclusive feature) of the Brown Multiple Recording Potentiometer Pyrometer is no mere arbitrary, ornamental dot . . . it has definite, practical significance in multiple temperature recording. The vertical line of the + sign identifies the temperature and the horizontal line the time coordinate. The intersection of the two lines locates the exact point of the time-temperature record.

The wide 12-inch chart and the distinct imprint of the unique number print wheel makes it possible to continuously record from two to six temperatures from as many different thermocouples.

The Brown Multiple Recording Potentiometer Pyrometer has all the inherent features of the standard Brown Potentiometer Pyrometer, including the 40-inch slide wire, enclosed galvanometer, rugged drive mechanism, synchronous motor, etc. Catalog No. 1102 gives full details and may be had on application to the Brown Instrument Company, Wayne and Robert Avenues, Philadelphia, Pa.

Italy Imports More Pulp

Italian imports of chemical pulp during the first 9 months of 1937 totaled 180,135 metric tons as against 174,281 tons for the corresponding period last year. Beginning with May 1, 1937, imports of chemical pulp destined for textile manufacture have been recorded separately, the aggregate for the five months period May 1 to September 30 amounting to 49,853 tons, while pulp for paper-making during the same period amounted to only 49,853 tons. Sweden and Finland together supplied approximately 80 percent of the pulp for textile manufacture and Austria 63 percent of the pulp to be consumed in paper manufacture. Canada during this period supplied 2,593 tons of pulp for textile manufacture and 630 tons for paper manufacture.

H. W. Sullivan Injured at St. Helens

[FROM OUR REGULAR CORRESPONDENT]

HUDSON FALLS, N. Y., January 3, 1938.—Information was received here this week relative to an automobile accident in which H. W. Sullivan, vice president of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers, was injured at St. Helens, Ore. He suffered the loss of several teeth and lacerations of the face and head. He is now confined to a hospital in Portland where he is improving.

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Sprängsviken, Sweden

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Greaker, Norway
BERGVIK OCH ALA NYA AKTIEBOLAG
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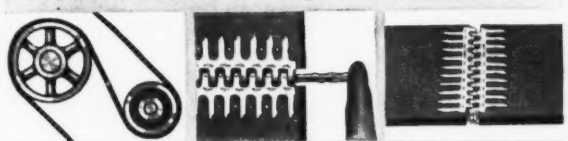

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New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, January 5, 1938.

The wholesale paper market has been seasonably quiet over the holidays and demand is reported as relatively light for the current week. Prices continue on the same level as for some weeks, with only scattered reports of reductions from the prevailing spot and contract market prices. The opinion is widespread in the trade that inventories are now so low that an improved demand should set in this month. For the current week, business is largely done on a hand-to-mouth basis.

The demand for book papers is reported a little better and more inquiries are in hand during the current week than for the past week. The writing paper market continues to report business as very quiet. Somewhat more optimism is expressed, however, as to the future and more activity in the bond grades of paper is expected this month.

Ground wood papers are in relatively larger demand than other grades. The tissue paper market reports trading as light, with the expectation that demand will improve during the current month.

The demand for kraft papers continues light. Prices are well maintained and a gradual improvement in sales volume is anticipated for January.

Chemical Pulp

The chemical pulp market reports trading as very quiet. The downward trend in demand which has prevailed for some weeks, and which has resulted in a reduction in prices of many grades pulp last week, still continues. The current prices for the first quarter of 1938, compared with the final quarter of last year, reflect a reduction in prices up to 15 per cent. Prices of many grades of pulp are lower for the current week.

Mechanical Pulp

The demand for mechanical pulp continues downward. A further reduction in prices is expected in some quarters of the pulp trade, but as the production of ground wood is to a large extent dependent upon the weather, the future course of prices in this commodity are uncertain.

Old Rope and Bagging

The old rope market reports demand as very light. Prices are unchanged for the week. Trading in the bagging market is light and no changes in prices are reported this week.

Rags

The domestic rag market is very quiet. No change in prices are reported for the current week. There is practically no demand for foreign rags and prices continue nominal.

Waste Paper

The demand for all grades of waste paper continues very light. Prices continue unchanged from last week, with the exception of ledger stock which is higher for this week.

Twine

The twine market reports conditions as quiet. A reduction in the prices of cotton twine and in several grades of hard fiber twines are reported for this week.

German Pulp Production Steady

Production in the German pulp and paper industry was consistently maintained at a high level up to the end of September. Accepting the average for the year 1936 as 100, the index for the number of workers engaged in the industry steadily increased from 101.4 in January to 108.6 in September. The index for paper and board production is available only up to August. The increase in production during this period has paralleled that in occupation. Based on the year 1935 the index of production for paper in January was 117.9 with a peak occurring in May when the index reached 133.5. During the summer months there was a slight cessation in production, the index for the three summer months averaging about 126. The business revival in Germany is reflected in the various types of paper which show an increase in production. For example, the output of kraft paper and of cable and insulating paper show heavy increases. A substantial increase is also noticeable in the output of straw paper, strawboard and bogus wrapping paper. Production of newsprint, another important item, remained at about last year's level.

Uses of Latex and Rubber Derivatives

Compiled in two volumes, covering 1700 pages and 22 chapers, "Latex and Rubber Derivatives and Their Industrial Applications" by Frederick Marchionna supplements the work of the first issue of Mr. Marchionna's bibliography which was published in 1933. The present edition covers the period from June, 1932, to date.

The volume abstracts every patent, on the subjects of latex and rubber derivatives, issued in the United States, England, France and Germany, as well as technical articles which have appeared in numerous technical journals.

Of special interest to the paper industry, is chapter eight devoted to "Paper and Artificial Leather Manufacture" the introduction of which was written by Geo. A. Richter and M. O. Schur, of the Brown Paper Company.

The volumes, which can not be purchased separately, are being sold at $20 for the two. *Rubber Age*, 250 West 57th street, New York City, is the publisher.

Sinclair Single Pedestal Stand

(Pat. Applied For)

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Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, January 5, 1938.

BLANC FIXE—The demand for blanc fixe is reported as steady. Prices continue unchanged. The pulp is offered at from $42.50 to $45 per ton, in bulk; the powder is quoted at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—The bleaching powder market is steady. Prices are firm and continue unchanged for the current week. Bleaching powder is quoted at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN—The demand for casein is reported as fair for the week. Domestic standard ground casein is quoted at from 11 to 11½ cents per pound; domestic finely ground casein at 11½ to 12 cents per pound; all in bags, can lot quantities.

CAUSTIC SODA—The caustic soda market continues at the level of last week. Prices are firm. Solid caustic soda is quoted at from $2.10 to $2.30 per 100 pounds; flake and ground at from $2.50 to $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—The demand for china clay is reported as steady. Prices are unchanged. Imported clay is quoted at from $14.50 to $25 per ton, ship side. Domestic filler clay is quoted at from $6.50 to $12 per ton; coating clay at from $11 to $22 per ton, at mines.

CHLORINE—The chlorine market continues steady, with prices firm and unchanged from the quotations of the preceding week. Chlorine is quoted at $2.15 per 100 pounds, in single-unit tank cars, f.o.b. works.

ROSIN—The demand for rosin is reported steady. Prices are higher for the current week. Paper making rosin is quoted at $5.62: wood rosin at $5.45 per 280 pounds, gross weight, in barrels at Savannah. Seventy per cent rosin size is quoted at $2.94 per 100 pounds, in tank cars, f.o.b., shipping point.

SALT CAKE—The salt cake market continues steady, with little or no domestic salt cake available. Quotations range at from $12 to $13.50 per ton; chrome salt cake at from $11 to $12, f.o.b., shipping point. Imported salt cake is quoted at from $14.50 to $15 per ton, Gulf Atlantic Seaboard, on dock.

SODA ASH—The soda ash market continues steady. Prices remain firm. Quotations on soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $.90; in bags, $1.05; and in barrels, $1.35.

STARCH—The starch market continues on about the same level as the preceding week. Prices are firm. Globe pearl is offered at $2.60 per 100 pounds, in bags, and at $2.85 in barrels. Special paper starch is quoted at $2.70 per 100 pounds, in bags, and at $2.95 in barrels; all prices in car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—The demand for sulphate of alumina is about on the level of last week. Prices are firm and unchanged. The commercial grades are quoted at from $1.25 to $1.60; iron free at from $2 to $2.25 per 100 pounds, in barrels, at works.

SULPHUR—The sulphur market continues steady. Prices are firm and unchanged for the current week. Annual contracts are quoted at $18 per long ton, f.o.b., cars at mines. Spot and nearby car lots are quoted at $21 per ton.

TALC—The talc market reports trading as moderate. Prices are unchanged from last week. Domestic talc is quoted at from $15 to $18 per ton, Eastern mines. Imported talc is offered at from $25 to $40 per ton, on dock.

Market Quotations

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	@	—
Kraft—per cwt.—Delivered Zone A			
No. 1 Northern	$5.50	@	—
Superstandard	5.00	@	—
Northern Standard Wrapping	4.75	@	—
Standard Wrapping	4.50	@	—
Tissues—Per Ream—Carlots			
White No. 1	1.02½	@	—
White No. 1 M. G.	.97½	@	—
White No. 1½	.67½	@	—
White No. 2	.60	@	—
Anti-Tarnish M. G.	.75	@	—
Colored	.87½	@	—
Kraft	.75	@	—
Manila	.60	@	—
Unbl. Toilet, 1 M.	3.40	@	—
Bleached Toilet	5.26	@	—
Paper Towels—			
Unbleached	1.95	@	—
Bleached	3.15	@	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	$8.25	@	$10.25
No. 2 Jute	7.50	@	9.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00
Boards, per ton—			
News	35.00	@	37.50
Chip	35.00	@	37.50
Sgl. Mla. Ll. Chip	52.50	@	—
Jute Lined Chip	52.50	@	—
White Pat. Coated	65.00	@	—
Kraft Liners	55.00	@	—
Binders Boards	75.00	@	80.00

The following are representative of distributors' resale prices:—

Rag Content Bonds and Ledgers—
White, Assorted Items.
Delivered in Zone 1:

	Bonds	Ledgers
100% Rag Ext. No. 1	$41.40@$48.50	$42.55@$50.00
100% Rag	32.80@ 38.50	33.95@ 39.75
85% Rag		32.20@ 37.75
75% Rag	24.75@ 29.00	25.90@ 30.50
65% Rag	21.65@ 26.25	22.80@ 27.75
50% Rag	18.70@ 22.75	19.90@ 24.25
25% Rag	15.80@ 19.25	16.95@ 20.75

Regular Colors @ $1.50 cwt. extra.
Heavy Colors @ $3.00 cwt. extra

Sulphite Bonds and Ledgers—
White, Assorted Items.
Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$9.35@$11.50	$10.55@$12.75
No. 2	8.50@ 10.25	9.65@ 11.75
No. 4	7.60@ 9.25	8.80@ 10.75

Regular Colors @ $1.50 cwt. extra.
Heavy Colors @ $3.00 cwt. extra.
Free Sheet Book Papers—
White, Cased Paper,
Delivered in Zone 1:

No. 1 Glossy Coated	$12.15@$14.25
No. 2 Glossy Coated	10.55@ 12.25
No. 3 Glossy Coated	9.35@ 11.00
No. 4 Glossy Coated	8.80@ 10.50
No. 1 Antique (watermarked)	8.80@ 10.50
No. 2 Offset	8.05@ 9.50
A Grade E. F.	7.90@ 9.50
A Grade S. & S. C.	8.15@ 9.75
B Grade E. F.	7.30@ 8.75
B Grade S. & S. C.	7.55@ 9.00
C Grade E. F.	7.00@ 8.50
C Grade S. & S. C.	7.25@ 8.75
D Grade E. F.	6.75@ 8.25
D Grade S. & S. C.	7.00@ 8.50

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	35.00	@	36.00
Dry	40.00	@	42.00
(Delivered)			
No. 1 Domestic and Canadian	34.00	@	35.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.00	@	4.15
Prime Qualities—			
Easy-Bleaching Sulphite	2.50	@	3.25
Strong Unbleached Sulphite	2.25	@	3.00
(On Dock, Atlantic Ports)			
Kraft Bleached	3.00	@	4.00
Kraft Light & Strong	2.75	@	3.00
Kraft No. 1	2.25	@	2.75
Kraft No. 2	2.00	@	2.25
(F.o.b. Pulp Mill)			
Kraft Domestic	2.00	@	2.50
(Delivered)			
Soda Bleached	2.90	@	—

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	7.00	@	7.25
Silesias, No. 1	5.00	@	5.25
New Unbleached	7.50	@	8.00
Blue Overall	6.00	@	6.25
Fancy	2.60	@	2.65
Washables	2.10	@	2.25
Mixed Khaki Cuttings	3.60	@	3.75
O. D. Khaki Cuttings	4.35	@	4.50
Old Rags			
White, No. 1—			
Repacked	3.50	@	3.60
Miscellaneous	2.75	@	3.00
White, No. 2—			
Repacked	2.10	@	2.25
Miscellaneous	1.70	@	1.80
Thirds and Blues—			
Repacked	1.40	@	1.50
Miscellaneous	1.25	@	1.30
Roofing Rags—			
No. 1	1.15	@	1.25
No. 2	.85	@	.80
No. 3 (bagging)	.65	@	.70
No. 4	.65	@	.70
No. 5A	.65	@	.70

Foreign Rags

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	@	2.20
New Light Silesias	5.50	@	5.75
Light Flannelettes	5.50	@	5.75
New White Cuttings	7.00	@	7.50
New Light Oxford	4.00	@	4.50
New Light Prints	3.00	@	3.25
Old Rags			
No. 1 White Linens	7.50	@	8.50
No. 2 White Linens	6.50	@	7.50
No. 3 White Linens	4.50	@	5.50

RAG CUTTERS

TAYLOR, STILES & COMPANY
TRADE MARK
GIANT
REG. U.S. PAT. OFF.
RIEGELSVILLE, N.J.U.S.A.

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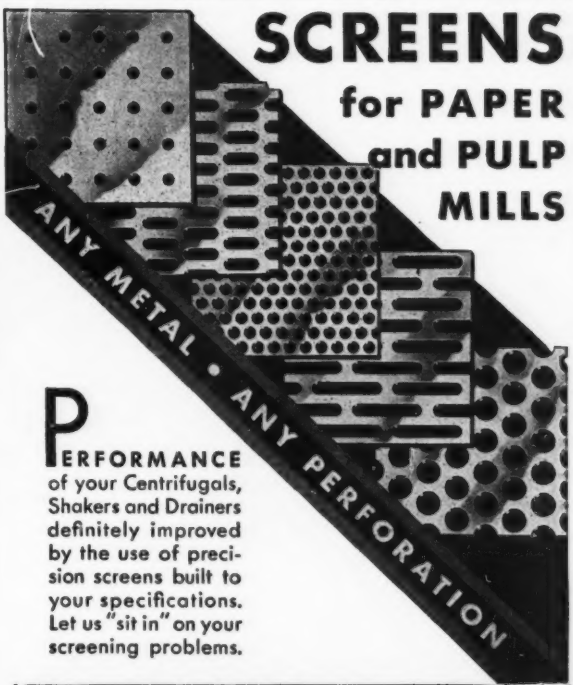

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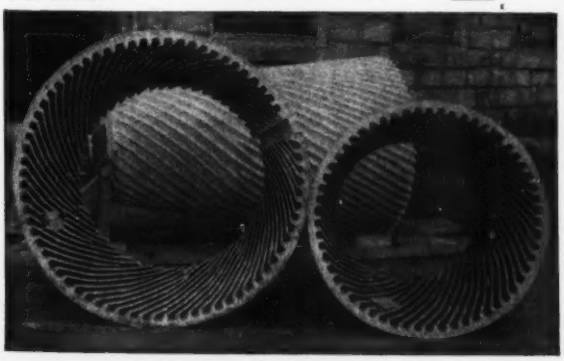

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No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	@	4.75
No. 2 White Cotton.	3.25	@	3.75
No. 3 White Cotton.	2.50	@	3.00
No. 4 White Cotton.	1.90	@	2.20
Extra Light Prints..	2.00	@	2.40
Ord. Light Prints...	1.75	@	2.15
Med. Light Prints...	1.55	@	1.95
Dutch Blue Cottons..	2.25	@	2.50
French Blue Linens..	3.00	@	—
Checks and Blues...	2.00	@	—
Linsey Garments....	1.90	@	2.00
Dark Cottons.....	1.50	@	1.60
Old Shopperies.....	1.30	@	1.45
New Shopperies.....	1.45	@	1.50
French Blues.....	2.25	@	2.50

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	2.20	@	2.25
Domestic	2.00	@	2.15
Wool Tares, light....	1.50	@	1.75
Wool Tares, heavy..	2.00	@	2.10
Bright Bagging.....	1.60	@	1.70
Manila Rope—			
Foreign	2.75	@	3.00
Domestic	2.75	@	3.00
Jute Threads.....	2.75	@	3.00
Sisal Strings.....	1.75	@	2.00
Mixed Strings.....	.60	@	.70

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	2.50	@	2.60
Ordinary Hard White No. 1....	1.90	@	2.00
Soft White No. 1..	1.80	@	2.20
Flat Stock—			
Stitchless	.70	@	.80
Overissue Mag.....	.60	@	.70
Solid Flat Book...	.50	@	.55
Crumbled No. 1...	.40	@	.45
Ledger Stock.....	.90	@	.95
New B. B. Chips....	.15	@	.20
Manila—			
New Env. Cut....	1.85	@	2.00
New Cuttings.....	1.50	@	1.60
Old Kraft Machine—			
Compressed bales..	.70	@	.80
News—			
No. 1 White News	1.10	@	1.20
Strictly Overissue.	.45	@	.50
Strictly Folded....	.30	@	.35
No. 1 Mixed Paper..	.15	@	.20

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.15	@	.16½
White Hemp.....	.16	@	.17½
Fine Polished—			
Fine India.....	.20	@	.22
Unpolished—			
Box	.11	@	.11½
Paper Makers.....	.11	@	.12¾
Tube Rope	.11½	@	.14¾
Wall Paper	.12½	@	.13¾
Wrapping	.14	@	.14½
Soft Fiber Rope...	.13¾	@	.14¼
Cotton	.16	@	.20

(Hard Fiber)

Medium Java.....	.11	@	.11½
Mex. Sisal.....	.10	@	.10½
Manila	.20	@	.27
Domestic	3.00	@	3.25
Transmission Rope...	1.75	@	1.90
Soft Jute Ropes....	1.90	@	2.00
Jute Carpet Threads.	1.40	@	1.60
Gunny Bagging—			
Foreign	2.15	@	2.25
Domestic	1.80	@	1.90
Bleachery Burlap....	3.50	@	4.00
Scrap Burlap			
Foreign	1.80	@	1.90
Domestic	1.80	@	1.90
Scrap Sisal.....	1.75	@	1.80
Scrap Sisal for Shredding	2.00	@	2.25
Wool Tares, Heavy..	2.00	@	2.05
New Burlap Cuttings	2.00	@	2.25
Aust. wool pouches..	3.00	@	3.25
Heavy Baling bagging	1.90	@	2.00
Paper Mill Bagging.	1.50	@	1.60
Bagging No. 2.....	.85	@	1.00

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	.03	@	.03¼
New White No. 1.	.07½	@	.07¾
New White No. 2.	.05½	@	.05¾
New Light Flannelettes	—	@	.06
Silesias No.	.05½	@	.06
New Black Silesias..	.03¾	@	.04
Silesias No. 1			
Soft Unbleached.....	.07	@	.07½
Blue Cheviot	.06½	@	.06¾
Fancy	.03	@	.03¼
Washable	.02¾	@	.03
Cottons—According to grades—			
Blue Overalls.....	.06½	@	.06¾
New Black, soft...	.03¾	@	.04
Khaki Cuttings.....	.03½	@	.04
O. D. Khaki.....	.04	@	.04½
Corduroy	.02¾	@	.03
New Canvas.....	.07¼	@	.07¾
B. V. D. Cuttings.	.08¼	@	.08½

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues.....	1.75	@	2.00
Third and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62¾
Black Stockings.....	3.90	@	4.00
Roofing Stock—			
No. 1.....	1.00	@	1.10
No. 2.....	.75	@	.85
No. 3.....	.65	@	.70

Foreign Rags

(F. o. b. Boston)

Dark Cottons.....	1.30	@	1.40
Dutch Blues.....	2.85	@	3.00
New Checks and Blues	2.85	@	3.00
Old Fustians.....	2.50	@	2.60
Old Linsey Garments	1.90	@	2.00
New Silesias.....	6.00	@	6.50

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	.06	@	.06½
New White, No. 2.	.04	@	.04½
Light Silesias.....	.05½	@	—
Silesias, No. 1....	—	@	.05½
Black Silesias, soft.	.03	@	.03½
New Unbleached...	—	@	.06½
Washable, No. 1..	.01¾	@	.02
Blue Overall.....	.04	@	.04½
Cottons—According to grades—			
Washable, No. 2..	.01¼	@	.01½
New Blue.....	.01¼	@	.01½
Fancy Percales....	—	@	.03½
New Black Soft...	.03	@	.03½
New Light Seconds	—	@	.05½
New Dark Seconds	1.00	@	1.25
Khaki Cuttings—			
No. 1 O. D.....	.03½	@	.04
No. 2 Mixed.....	—	@	.02¼
Corduroy	.02	@	.02½
New Canvas.....	.06	@	.06½
New Black Mixed.	.02	@	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	3.00	@	3.25
Miscellaneous	2.75	@	3.00
Thirds and Blues—			
Miscellaneous	1.25	@	1.50
Repacked	1.50	@	1.75
Black Stockings (Export)	3.00	@	3.50
Roofing Stock—			
Foreign No. 1.....	—	@	1.00
Domestic No. 1....	—	@	1.00
Domestic No. 2....	.85	@	.90
Roofing Bagging..	.80	@	.90

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	1.75	@	—
Domestic	1.70	@	1.75
Manila Rope.....	3.00	@	3.25
Sisal Rope.....	2.00	@	2.25
Mixed Rope	1.00	@	1.10
Scrap—			
No. 1.....	1.50	@	—
No. 2.....	1.00	@	1.25
Wool Tares, heavy..	3.25	@	3.50
Mixed Strings.....	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	2.00	@	2.25

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White.	2.35	@	2.40
No. 2 Hard White.	2.00	@	2.10
No. 1 Soft White..	2.00	@	2.10
No. 2 Soft White..	1.40	@	1.50
No. 1 Mixed.....	.70	@	.75
Solid Ledger Stock..	1.50	@	1.60
Ledger Stock, white.	1.25	@	1.30
Ledger Stock, colored	.85	@	.90
No. 1 Books, heavy..	.85	@	.90
Manila Cuttings.....	1.50	@	1.75
Print Manila.....	.45	@	.50
Container Manila....	—	@	.40
Kraft Paper.....	.90	@	.95
No. 1 Mixed Paper..	.25	@	.30
Straw Board Chip...	.25	@	.30
Binders Board Chip.	.25	@	.30
Corrugated Board...	.50	@	.55
Overissue News.....	.55	@	.60
Old Newspapers	.30	@	.35

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White.	2.25	@	2.40
No. 1 Soft White..	1.85	@	2.15
No. 2 Mixed.....	.75	@	.80
Solid Ledger Books..	1.50	@	1.75
Overissue Ledger Stock	1.30	@	1.50
Mixed Ledgers.....	.85	@	.90
No. 1 Books, heavy..	.65	@	.75
No. 1 Books, light...	.65	@	.75
Crumpled Stitchless Book Stock	.50	@	.60
Manila Env. Cuttings	1.60	@	1.70
Manila Envelope Cuttings, extra quality	2.00	@	2.10
No. 1 Old Manila....	.85	@	.95
White Blank News..	1.30	@	1.40
No. 1 Kraft.....	.90	@	1.00
Mixed Papers	.10	@	.15
Print Manila.....	.45	@	.50
Container Manilas...	.27½	@	—
Old Newspapers.....	.20	@	.25
Paper Wool Strings.	—	@	.60
Overissue News.....	.45	@	.50
Box Board Chips....	.35	@	.40
Corrugated Boxes...	.25	@	.27½
Kraft corrugated boxes	.60	@	.70
Screenings wrappers.	.45	@	.50

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	2.50	@	3.00

CHICAGO

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings....	3.15	@	3.25
No. 1 Hard White.	2.50	@	2.60
No. 1 Soft White..	2.05	@	2.10
Ledger & Writings..	1.30	@	1.40
Solid Books.....	1.20	@	1.25
Blanks	1.40	@	1.50
Krafts	.90	@	1.00
New Kraft Cuts.....	1.70	@	1.80
Manila Env. Cuts...	2.15	@	2.25
Ex. No. 1 Manila...	2.15	@	2.25
Print Manila.....	1.70	@	1.80
Overissue News.....	.60	@	.70
Old Newspapers—			
No. 1 Folded News	.45	@	.50
No. 1 Mixed Paper	.35	@	.40
Roofing Stocks—			
No. 1.....	2.00	@	2.25
No. 2.....	1.85	@	2.00

TORONTO

Paper

Bonds and Ledgers

Delivered

No. 1 White	.35½	@	.36½
No. 1 Tints	.36½	@	.37½
No. 2 White	.26½	@	—
No. 2 Tints	.27½	@	—
No. 4 White	—	@	.1550
No. 4 Tints	.16	@	.1650
No. 5 Bond—White	.11.35	@	—
No. 5 Bond—Tints	.12.35	@	—
No. 5 Bond—Golden Rod	13.35	@	—
No. 5 Ledger—White	.1185	@	—
No. 5 Ledger—Tints.	.1285	@	—
No. 6 Bond—White	.10.75	@	—
No. 6 Bond—Tints	.11.25	@	—
No. 6 Bond—Golden Rod	12.75	@	—
No. 7 Bond—White .	9.10	@	—
No. 7 Bond—Tints .	9.60	@	—
No. 7 Bond—Golden Rod	11.10	@	—
Book—			
No. 1 M. F.	7.10	@	7.35
No. 2 M. F.	6.85	@	7.20
No. 3 M. F.	5.60	@	6.20
No. 1 S. C.	7.60	@	7.85
No. 2 S. C.	7.10	@	7.35
No. 3 S. C.	6.10	@	6.35
No. 1 Coated and Litho	12.50	@	—
No. 2 Coated and Litho	11.00	@	—
No. 3 Coated and Litho	9.50	@	10.00
Coated tinted.....	13.00	@	13.50
Wrapping—delivered—			
Rag Brown.....	4.85	@	5.55
White Wrap.....	4.00	@	—
"B" Manila.....	4.90	@	6.25
No. 1 Manila.....	5.50	@	7.00
Fiber	5.50	@	—
Kraft, No. 2.....	5.50	@	—

(F. o. b. Cars, Toronto)

News, per ton—			
Rolls (contract)...	38.50	@	—
Sheets	45.50	@	—

Pulp

Ground wood.....	32.00	@	—
Unbleached Sulphite.	59.00	@	—
Book (Class 1).....	71.00	@	—
Writing (Class 2)..	72.00	@	—
Select (Class 3).....	73.00	@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut...	2.50	@	—
Soft White.....	2.15	@	—
White Blk. News..	1.25	@	1.40
Book and Ledger—			
Flat Magazine and Book Stock (old)	1.00	@	—
Light and Crumpled Book Stock.	.85	@	—
Ledgers and Writings	1.20	@	—
Manilas—			
New Manila Cut...	1.50	@	—
Printed Manilas...	.65	@	—
Kraft	1.00	@	1.70
News and Scrap—			
Strictly Overissue.	.65	@	—
Strictly Folded....	.60	@	—
No. 1 Mixed Paper..	.50	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.09	@	.09¼
Fancy Shirt Cuttings	.03½	@	.03¾